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CANADIAN GEOGRAPHICAL JOURNAL

Editor - Gordon M. Dallyn

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This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustration, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth, and other parts of the world in which Canada has special interest.

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COVER SUBJECT:—Snyder Mountains, in the southeastern section of Yukon Territory, which were partially explored last summer by an expedition under the leadership of Mr. Harry Snyder, of Montreal. Mr. Snyder, who has just become a Canadian citizen and been elected a Fellow of the Royal Geographical Society, addressed members of the Canadian Geographical Society on March 3rd in Ottawa, when he supplied much interesting information additional to that contained in a well-illustrated article written by him for the Canadian Geographical Journal last October. A director of the Canadian Geographical Society, Mr. Synder has contributed materially to the development of Canada's North West, including the production of radium at Great Bear Lake. It is believed that the range of mountains so graphically illustrated on the front cover of this issue, constitutes the most recent geographical formation in North America. See page V. *(Colour plates by courtesy of The Gazette Printing Co., Limited.)*

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The British standard of spelling is adopted substantially as used by the Dominion Government and taught in most Canadian schools, the precise authority being the Oxford Dictionary as edited in 1929.

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FIBRES OF GOLD

by **T. R. ELLIOTT**

ASBESTOS is one of the few known materials with which the world's store of energy can be conserved; and Canada has the world's largest deposits of asbestos; largest and best, for they are deposits of chrysotile, most desirable of all the varieties of asbestos found in nature.

While it is a well-known fact that no variety of asbestos will burn, it is also a fact that some kinds are low in tensile strength or high in undesirable chemical content. This limitation however does not apply to chrysotile; flexible and finely divided, its longer fibres are capable of being spun into a strong thread weighing less than one ounce per hundred yards and its shorter ones are ideal for heat resisting papers.

There is a special significance in the very meaning of the word chrysotile; derived from the Greek, a literal translation gives us "fibres of gold;" this name, undoubtedly given because of the colour, does not apply in the original sense to Canada's asbestos, which is rather more green than gold in its crystalline state. It does apply, however, in the economic sense, inasmuch as Canada's mines are the source for much of the world's requirements. And while asbestos in a general way is being dedicated to the conservation of energy, that is chiefly for the selfish reason that the world lowers production costs, saves money, by saving heat. Canada finds its asbestos fibres are veritable fibres of gold in the industrial market.

It is premature to judge how important a place in the scheme of things asbestos will ultimately fill. True, asbestos is old, perhaps many millions of years, but only three quarters of a single century old in the service of humanity. New as it is in that sense, however, it is so taken for granted that few people take the trouble to study its history, thereby missing a little known and rather fascinating subject.

Of all the legends about asbestos to find their way into print, the one about Charlemagne and his trick tablecloth is the most commonly quoted. Charlemagne, it seems, was on the verge of war with Harun-Al-Rashid, Emperor of the East. Not feeling the urge to battle at the moment, he considered how he might avert such a conflict. When the Moslem envoys came to call, they dined with Charlemagne off a table-cloth which had been woven of asbestos fibres. After the banquet, Charlemagne himself "cleansed" the cloth by nonchalantly tossing it into the fire. The pupils of the envoys' eyes were still dilated when they left for home some time later and Charlemagne, the old cut-up, felt justified in assuming that he would be reported to the Eastern Emperor as one of the most potent Thurstons of the day. At any rate there was no war.

There is also the tale of old Marco Polo, globe-trotting Venetian, who had his credulity shattered during a visit to Siberia in 1250. There he saw an unburnable fabric which the Tartars told him was made from salamander skins.

Most interesting of all is our own Canadian folk-tale concerning the French-Canadian lumberjack and his magic socks. It happened in a camp in Northern Quebec away back in the eighteen-fifties. The camp crew trooped into the bunkhouse from a hard day in the melting snows of the spruce forest. They gathered about the red-hot box stove. One of the men, a newcomer, pulled off his boots and then his saturated socks. In full view of his mates he tossed the socks into the stove. Then amid petrified stares he drew them out clean and dry and put them on again. Within a few seconds he was alone in the bunkhouse, as any loup-garou or werewolf deserved to be. Tradition says the rest of the crew refused to return to work until "Magic Socks" was fired.

More significant in the development of asbestos commercially is the story of the Saturday night demonstration which used to be given in the little store of H. W. Johns on William Street in New York City, back in the early 'seventies.' Whenever a group of curiosity-seekers, attracted by rumours of a new substance called asbestos, would gather in the store, the manager would signal to his helper for

Left:—This is the demonstration which used to amaze the customers in the little store of H. W. Johns on Broadway in the "seventies."

the serpentine belt was revealed, recognition was not slow in coming. A French-Canadian named Fecteau is credited with being the first to observe the prevalence of the fibre veins. Among the earliest, too, were the brothers, Alfred and Robert Ward, and to them must be given the palm as the practical discoverers, for, without delay, they acted. They turned over their discovery to their brother-in-law Andrew S. Johnson. He in turn started a mine which by 1878 had produced 50 tons, and which today is the largest independently-owned asbestos mine in the Thetford area.

Some hint of this activity at Thetford undoubtedly reached the farmers of Shipton Township, although in those days the distance of 25 miles was a considerable barrier. At any rate Evan Williams now stepped into the Shipton picture. He may have seen the workings of existing mines, or he may only have heard of the incombustible socks knitted by Mrs. Webb. He was, at all events, positive enough. He said: "This is asbestos you've got here. It is worth mining."

At first the farmers of Shipton were not very much excited but Williams soon took action which shattered the serenity of the peaceful valley and made the residents think of their community in new terms. Williams himself was without funds, so he went over to Richmond, a dozen miles away, and told his story to W. H. Jeffrey, a distinguished looking elderly Englishman who was known in the district as a well-to-do farmer.

The aristocratic Jeffrey saw his opportunity and lost no time in making an arrangement with Charles Webb for mining the asbestos on a royalty basis. Three small converging pits were opened about 1881, and labour was recruited from many sources to blast the rock, chisel out the fibre, and transport it by wagon to the railway at Danville Station. The pit employees, incidentally, included Evan Williams. Charles Webb was teamster.

Now the scene began to change. Before long the spot became known as "Jeffrey's Pit" or "Jeffrey's Mine" instead of Webb's Ledge. Every morning the pit boss called the men to work by clanging an old bell on the limb of a tree. The sound of detonating black powder began to be a frequent occurrence. The very first blast startled the horses of James Webb, father of the owner of the property, and the old man was thrown from his mower and injured.

Mining operations were somewhat primitive. A single horse, walking round and round, powered the first derrick to hoist out rock, or large barrels of water when it became necessary to drain the flooded workings. The road to Danville was bad, and sometimes six horses were necessary to haul a single wagon of fibre through the mud. Little stress was placed on accident prevention, and there were some tragic slides and explosions.

The name "cotton" began to be heard, probably from the incoming French-Canadian workmen who referred to the asbestos as "pierre à coton." Crude fibre was carried to a picking shed in boxes and there boys were employed "picking cotton." A diligent boy would sometimes fill as many as 12 bags a day at the rate of 10 cents a bag, thus making more than the pit men who were paid $1.00 a day.

Mine Operator Jeffrey, with a dubious market for high-grade crude fibre running perhaps around $80.00 a ton, had a little difficulty with financing and started to give the employees credit notes instead of cash. The village storekeepers accepted the credit notes all right, giving groceries and drygoods in exchange and not failing to charge 10 per cent discount. It was a rough and ready mining town, sometimes lawless, sometimes gay, and nameless until Mrs. Church was appointed postmistress and gave the growing community the label of Asbestos.

From this time on there was swift development of the asbestos deposits along the 70-mile serpentine strip in the Eastern Townships. There was, of course, improvement in mining methods, both at the Jeffrey Pit and at the other mines which were started about the same time. The prime influence, however, in the growth of the industry in Quebec Province was the fact that the quality of the fibre was better than anything that could be produced in other parts of the world. To this was added the important factor that the deposits were of enormous extent. For these reasons there was an early influx of prospectors and industrial men into the Quebec area, seeking to satisfy themselves that at last there had been discovered a sufficient source to supply the world with crude asbestos with the right qualities for the many industrial uses then being developed. H. W. Johns himself, the same man who gave New York something to stare at in his little store in the 'seventies' was among the first to prospect the

Mr. and Mrs. Gifford, Danville, Que.—Mr. Gifford was offered the "hilltop" at Hilltop field back in the late seventies for $50 but thought the price too high for a piece of rocky pasture. Since then $45,000,000 of asbestos has been quarried there. Mrs. Gifford, as a girl, used to pass the hilltop on the way to school and pluck strands of pure asbestos fibre for chewing gum.

The "hill" in the nineties with the town in the foreground showing buildings which have since either been destroyed or removed.

Eastern Townships of the Province of Quebec, along a chain of hills which are an extension of the Green Mountains of Vermont. There are outcrops of serpentine here between the towns of Danville, in Shipton Township, and East Broughton, farther north. This serpentine contains asbestos in quantities believed to be almost inexhaustible, and of a quality unattainable in the rest of the world. All through the area there are mines of considerable magnitude, but the most interesting of all is the Jeffrey Mine at the town of Asbestos, just a few miles from Danville in Shipton Township. It was one of the earliest mines and is today the world's largest.

First settlers in the township of Shipton, in which the town of Asbestos is situated, came through in Loyalist times from Vermont or New Hampshire. Oxen dragged the sleds bearing their families and household goods. Hardship was the common lot. Fodder gave out before the first crop could be harvested, and the oxen thankfully devoured the straw from the bedticks.

The only "cash crop" for a time was potash salts obtained by burning the beeches and maples of the hardwood forest. Nearly all the early farmers sold their quota of potash at Three Rivers to help them out until they were able to achieve an income from more agricultural crops.

Descendants of the Burbank, Willey, Stockwell and Cleveland families, now residents of the town of Danville, recall the tales of primeval hardship told them by their parents or grandparents who were among the first to trek into Canada in the 'seventeen-eighties'. They remember, too, that tradition gave credit for the discovery of asbestos in the Danville area to Evan Williams, a Welshman who came to visit his brother, Henry Williams, a farmer of the district. Evan Williams recognized asbestos fibre when he saw it, but being without means he had to look about for a promoter and operator. He himself worked as a labourer in the first asbestos pit.

With the coming of Evan Williams began the transformation of a community of scattered farms, providing a slender livelihood for a handful of settlers, into a town of 5,000 inhabitants, including descendants of the settlers who wrested such a perilous living from rocky farms before the fortunate discovery of the "golden fibre."

The place where the Welshman, Evan Williams, immortalized himself by recognizing asbestos fibre for what it was, is still remembered by old-timers as "The Ledge." It was a field on the farm of Charles Webb, a field unfit for crops and so relegated to cherry trees and wild shrubs.

One of the girls at the Johns-Manville factory dressed in the jacket and cap with which she and twenty others caused much comment at the Sherbrooke centennial celebration, 1937. She is operating one of the vending machines in the plant, proceeds of which go to the athletic association.

Winding improved Aircell pipe covering for use as insulation on hot water and low pressure steam pipes.

One day Mrs. Webb took her small son back to the Ledge to play under the trees while she knitted. The boy amused himself by pulling at the queer rock that came out in silky threads, and presently he had a heap of fluffy white fibres beside him. The thrifty mother, accustomed to carding, spinning and weaving sheep's wool into yarn and cloth, took the handful of fibres home, succeeded in spinning it, and with a further supply fabricated a pair of socks. Tradition says Mrs. Webb found that these socks were impervious to fire. She had never heard of the substance called asbestos, had no way of telling what she had used for yarn.

Webb's Ledge became famous in local geography. In the first place the young fry had to pass its rocky crest on the way to school. A generation of adventurous schoolboys learned how to sample the Webb cherries without being detected. A generation of gingham-clad schoolgirls waited at safe range to share the luscious spoils. Sometimes, while waiting, the girls would dig out the silky fibres from the rock nearby. They had no name for it, but they discovered the fluffy material was good to chew and that it could be twisted and braided into cord. Mr. and Mrs. James Gifford of Danville recall all this distinctly as one of the bright memories of school days. Mrs. Gifford remembers how she and her companions chewed the magic substance without as much as giving it a name, or being aware that it had commercial value.

James Gifford himself has one very poignant memory of Charles Webb's Ledge. The land was so rough that Webb couldn't get a fence to stand all round it. This he found a handicap in pasturing his cattle, and when young Gifford was starting a farm of his own, Webb offered him the Ledge field for $50. It was too high a price for a piece of absolutely waste land, Mr. Gifford figured, so he rejected the chance to acquire a property which subsequently has turned out about 45,000,000 dollars worth of asbestos fibre.

Although nobody in Shipton Township knew much about asbestos, it was just about this time that Canada was awakening to the value of her deposits of the mineral. Geologists had long known of the presence of asbestos in the serpentine rocks of the Eastern Townships because a Survey in 1850 mentioned the presence of the mineral, in quantities, however, which were believed to be unimportant. Traces were found from time to time in various localities of the region but there was no development. Meanwhile, far away in the Aosta Valley in Italy, a London syndicate was beginning to exploit the Italian asbestos deposits, and the fame of the product was not long in reaching North America. When therefore, in 1877, forest fires laid bare the rocks in Thetford and Coleraine Townships, and the treasure of

Reinforced Asbestos Roving used in the manufacture of asbestos covered electrical wiring.

Firemen everywhere are now equipped with asbestos garments for fighting oil fires. A typical suit such as placed about the Johns-Manville factory at Asbestos, Que., for emergency use.

the usual dramatic procedure. The helper would don a pair of white gloves, open the door of the glowing pot-bellied stove, and scoop out a double handful of coals. These he leisurely returned to the fire with no damage to hands or gloves.

This marked a transition in asbestos history, because at length there was no talk of magic. This New York storekeeper had heard of Italy's asbestos fabrics, had sent for samples of raw material, and with typical American forthrightness, was planning practical uses for the product. The planning has been going on ever since, and never more effectually than at the present time. The enormous facilities of science and industry, directed through vast research laboratories, are regularly engaged in finding ways to apply this treasure from the Canadian rocks to the needs of the industrial world.

There has always been great interest in the discoveries which created mechanical energy by converting nature's stores of coal, oil or waterpower, but not so much interest in discoveries that controlled the destructiveness of this man-made energy or that prevented its wastage. And yet control and conservation are all-important. James Watt with his steam engine had no sooner discovered how to apply converted heat to mechanical tasks than he was forced to consider the problem of keeping his energy-agent in its allotted channel, and so he insulated his primitive steam engine with strips of wood. It was as inadequate as an insulation job as Watt's little engine itself would be today in the powerhouse of a factory. Since then, fortunately, industry has learned how to apply asbestos. There are other barriers to waste and destructiveness, but asbestos is the leader. In the realm of heat—as textiles and compounds to resist high temperatures; in the realm of motion—to control by resisting friction, as with motor car brake linings; and in the realm of sound—with sound-deadening and acoustical fabrics.

Asbestos or an asbestos product is the first thing to be tried whenever the need arises for a material that insulates. It is impervious to decay, water, lyes, or acids; is porous, flexible, and fit for spinning. No wonder, then, there is such a long list of asbestos products on the market today. You find them everywhere: wall board, roofing, shingles, school blackboards, motion picture projection booths, smoke ducts, switchboards, paper tape for insulation, oven parts, clutch facings, fire blankets, fire-fighting clothing, cords, gaskets, rope and other kinds of oil or acid-resistant packing, yarn, tubing, and innumerable others.

Now just what is this asbestos that has come to be of such importance in our scheme of things? Asbestos is a non-metallic mineral, fibrous, flax-like, soapy to the feel, tasteless and odourless. It has the aspect of stone when found in the natural rock environment, but can be quickly "teased out" into a mass of snowy fibres. The rocky crystals quickly become fluffy particles capable of being spun and woven.

Science is more concerned with finding out things to do with asbestos than with finding out how asbestos itself was manufactured in nature's workshop, but the geological theory on the latter point is interesting. The stone in which asbestos occurs is conceded to be of volcanic origin. It is called olivin rock, and is a silicate of magnesia. In a long process of metamorphosis this rock was "serpentinized" or changed to colloidal form, swelling in the process so that the surrounding rock was pushed back. This "serpentine" then shrank in substance, causing parting or cracking, like a mass of glass smashed but not broken apart. Finally, possibly because of the action of volcanic steam or gas through these crevices, there began a growth of crystalline matter, of the same chemical formula as the serpentine itself, and this matter filled all available space with the fibrous stuff that is asbestos. The chemical composition of both the serpentine and the asbestos veins found in it is exactly the same.

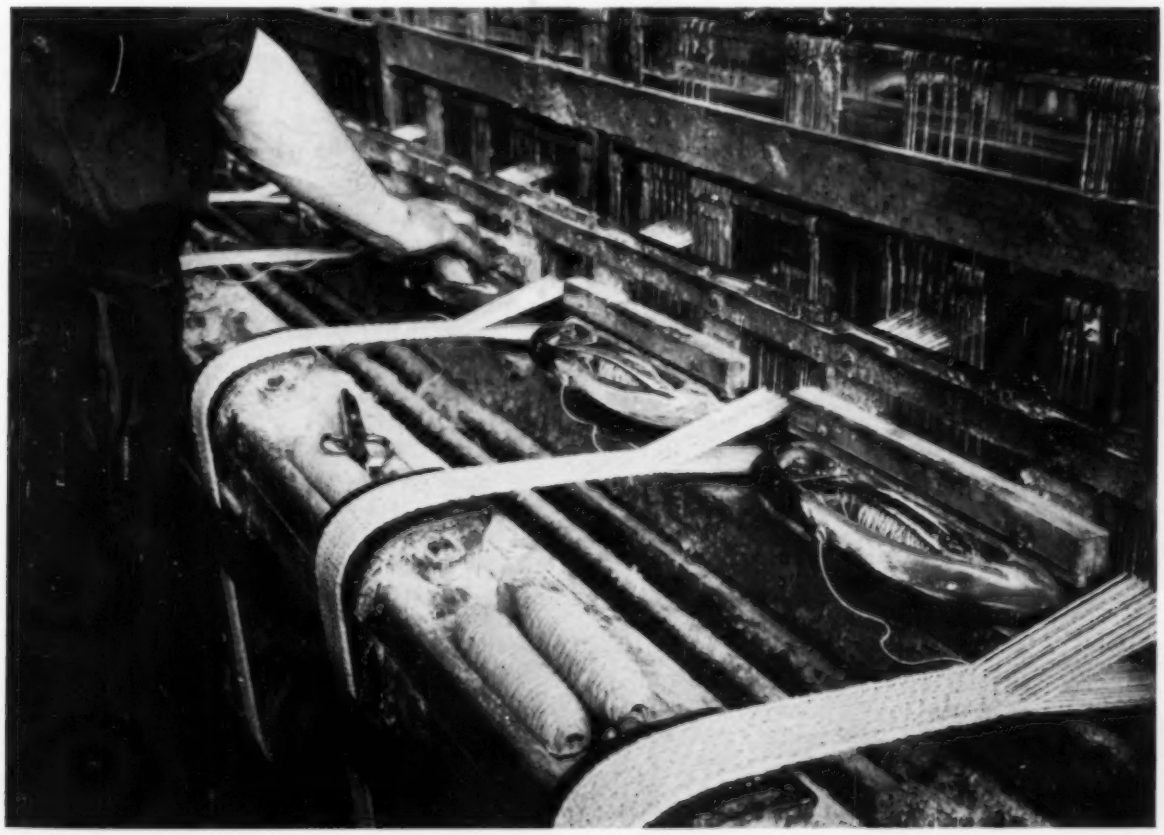
Nature's manufacture of other types of asbestos was believed to be similar, the parent rock in that case being hornblende, the resulting fibres being the so-called amphibole variety which are less valuable than chrysotile found in the serpentine rocks.

The approximate formula of chrysotile asbestos is $H_4Mg_3Si_2O_9$. Analysis of typical chrysotile shows: Silica 41.8 per cent, iron 2.1, magnesia 41.9 and water 14.1 per cent.

When nature performed all this hocus-pocus with olivin rocks and developed lavish beds of serpentine, she seemed to concentrate activities in a corner of the earth's surface that was some day to be part of Canada. That brings us to survey a seventy-mile strip of territory in the

The Johns-Manville Pit today, 3,500 feet wide, and its floor 350 feet below the old hilltop.

Producing woven asbestos brake lining on a narrow fabric loom.



possibilities of Quebec as a source of fibre. He knew, as did the ancients, that asbestos was fire resistant and could be woven into cloth, but he went further than that. He inaugurated many industrial uses for asbestos fibres, and this together with developments in mining and manufacturing by the organization he founded, created a market which meant undreamed-of success for the asbestos-producing area of the Province of Quebec.

The great majority of all the fibre mined in the world began to come from the pits in the Eastern Townships, the product being uniformly dependable in external structure and in its component parts. Asbestos from other countries was good only if it compared favourably with Canadian fibre. So the market ate up larger and larger supplies of Canadian asbestos, until in the year 1929, there were 311,200 tons shipped out of the Eastern Townships. Of this amount, the enormous quantity of over 100,000 tons came out of the Jeffrey Mine, acquired long before by Johns-Manville, and then as now the largest single asbestos mine on the face of the globe.

The Jeffrey Mine, however, had to experience a variety of growing pains before reaching such eminence. Mr. Jeffrey operated the property for about 14 years by what mining men later described as "rule of thumb" before he got into difficulties. Then, bankrupt, he offered the mine to Messrs. G. Boas, J. N. Greenshields and B. Marcuse. These three raised capital in England, formed a company called Asbestos and Asbestic Company Limited, and proceeded to work the property as it had never been worked before.

Mr. Boas was neither a mining man nor a mineralogist, but he was shrewd and energetic. It occurred to him that the serpentine rock in which the asbestos veins occured in Shipton Township was different from any other serpentine he had seen, and he wondered if everything possible was being done to extract all the valuable mineral. By simply knocking out the conspicuous fibre and then sending the rest of the rock to the dumps it was possible the operators were missing something. So he experimented and found that he was right; there were high values of asbestos fibre in the rock that was being wasted. The discovery resulted in the construction of the first asbestos mill.

No sooner was the mill constructed, with its complicated crushers and agitators and separators, than a railway was planned. The town of Asbestos was soon connected with Danville and the Grand Trunk, which had built a line from Richmond to Levis in 1852.

By this time the rocky hill on the old Webb farm was beginning to disappear. The boom derricks, first operated by horses and later by steam engines, had hoisted vast quantities of rock out of the three original pits, so that finally they merged into one, with a score of cableway derricks in operation. Steam shovels to move the rock were also introduced. The mill was enlarged and the quantity of fibre shipped increased by leaps and bounds. In those days the asbestos was shipped largely to England, France, Germany and Belgium.

Then came the Great War. Markets were disturbed and the outlook for the British capital invested at Asbestos seemed uncertain. Asbestos and Asbestic Company went into liquidation. Now appeared T. F. Manville, at that time associated with the H. W. Johns-Manville Company in the United States. He bought the Jeffrey Mine and mill and reorganized under the name of Manville Asbestos Company, Limited. About three years later, in September 1918, it became the Canadian Johns-Manville Company, Limited and as such it has continued until the present. Today there is not only a mine and mill, but also a factory where some of the fibre is fabricated into yarns and papers and various building products, most of them unheard-of until Quebec's superior chrysotile began to be mined in quantity.

And what a change in the Jeffrey Pit! Gone is Webb's Ledge, and with it the little village that grew up around the earliest workings. Buildings were moved time and again as the pit faces ate farther and farther into the rock. The mine today looks like nothing so much as a vast amphitheatre, a series of steps or benches rising from a rocky floor, each step about thirty-five feet high. Full-size railway trains travel along these ledges, hauling ore to the mill on the high ground or waste rock and earthy "overburden" to the mountainous dumps in the valley. Up and down and round about are power lines for electric current, pipe lines for drainage, compressed air lines for rock drills, and telephone lines for dispatching. The transportation system is operated through a dispatcher's tower, and a big

railway terminal is scarcely busier than this terraced pit in the rocky hillside.

Three hundred and fifty feet in the blue, almost directly above the centre of the mine's present bottom, is the spot where Webb's cherries grew and schoolgirls chewed the magic fibres plucked from the rock. The whole countryside has been laid open to the sky by the half-century of mining, until today the single pit measures more than 4,000 feet from rim to rim.

Open-pit mining is almost the universal method in Canadian asbestos operations, but this pit is unique in its adaptation of the open-pit method. Instead of the long cableways and skips (boxes) formerly used to handle the ore in some other large mines, such as the Asbestos Corporation's large pit at Thetford Mines, locomotives and dump cars are employed on the benches, and the "glory hole" method is employed. Every part of the operation is on a titanic scale, and constantly conducted with the precision and efficiency of a well-planned army manoeuvre. It is one of the most fascinating action-pictures in Canadian industry.

The first stage is exploration. Core drillers sink their diamond-studded rotaries deep into the terrain. The cores of serpentine rock come to the surface, slender cylindrical tell-tales of the size and quality of the ore body. These are filed in boxes like documents in a cabinet. Then comes the process of stripping. Huge shovels, electrically powered, claw the covering of soil from the serpentine rock. The soil and waste are taken direct in trainloads to the dumps. Drilling and blasting come next. Many holes are drilled in the rock face, loaded with explosive, and detonated. The primary blasts move the face of the rock out on the bench, and secondary blasts still further divide the larger masses.

Then come the big power shovels, tracks are quickly lifted and run in, and the process of sorting and loading begins. Shovel operators and supervisors decide what is waste rock for disposal on the dumps and also select the grades of ore desired for milling. Accordingly a crew of "cobbers" is employed to pick crude fibre by hand from the shattered rock. With pail and hammer they traverse the ore face collecting all possible quantities of fibre one-half of an inch long or longer. This is the "crude," which needs no further processing except cleaning and screening in the cobbing shed to make it ready for spinning. There are two grades of crude, the first consisting of fibres three-quarters of an inch long or longer; and the second consisting of fibres between one-half and three-quarters of an inch long. It is valued at from $200 to $750 a ton, really a nominal figure because demand for crude is always considerably ahead of the supply. The crude having been saved, the mill ore is loaded into cars and taken to the mill-bins to await crushing.

That, briefly, is the mining operation, but it falls far short of telling the whole story. The pit is humming night and day, with powerful electric lights to expedite the loading of material between dark and dawn. Summer or winter the work continues, and storms and frost and heavy snows challenge the courage and endurance of the mine crews. Operations are forever on the move. Compressed air lines, pumps, power lines, railway tracks, towers and poles, all have to be moved continually. Equipment maintenance is a herculean task in itself, and movement of supplies is a vital job.

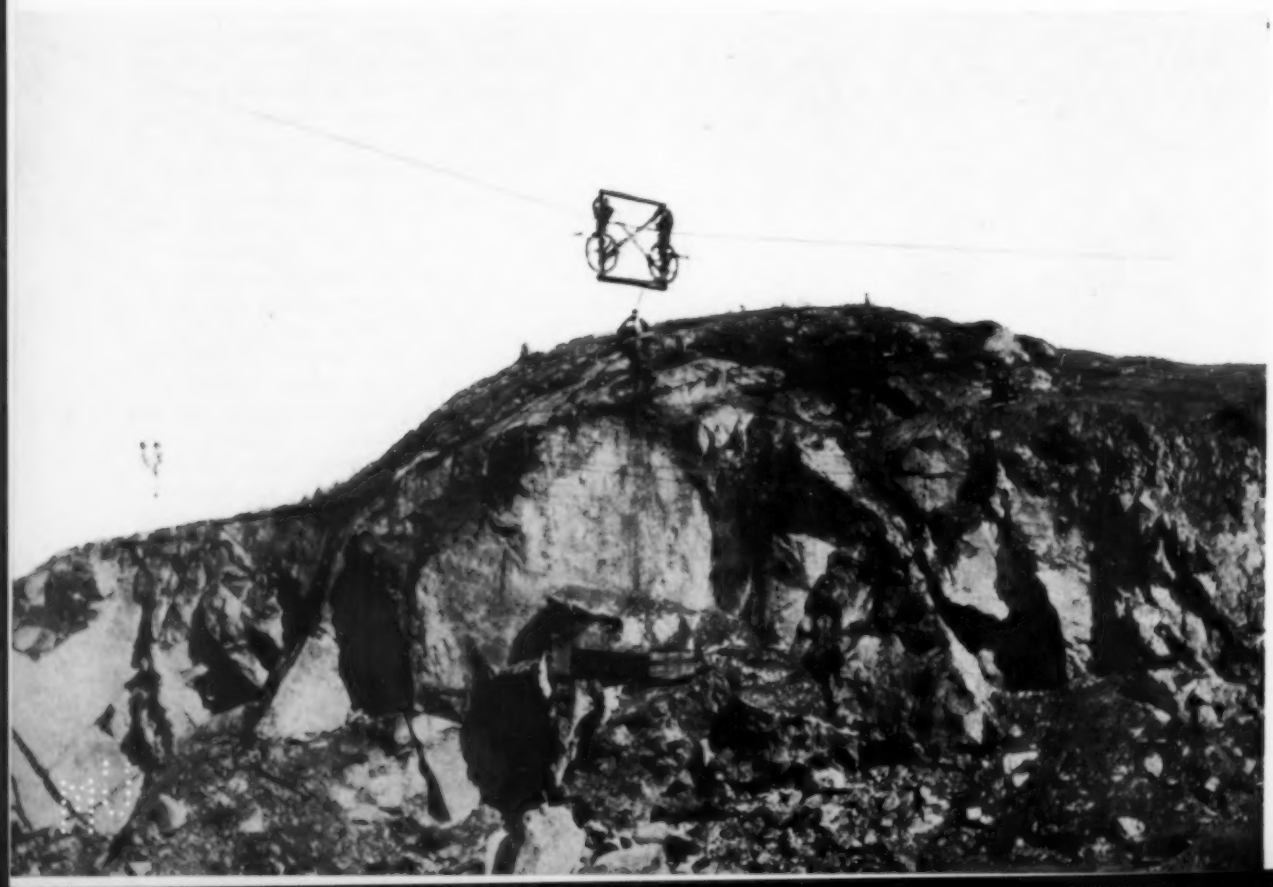
Operation of all these services requires such an establishment as is seldom found in other types of mines in Canada. The buildings on the property are eloquent of the size of the job. There is a roundhouse for the 24 locomotives; a series of magazines for the storage of explosives; a storehouse for operating and maintenance supplies; a coal-chute, gravel station, scalehouse, track cabins, phone cabins, water tanks and gas tanks. Naturally there is a steady inflow of supplies of all kinds, including fuel, lubricating oil, explosives, drills, drill steel, track materials. The mine is a big consumer as well as a big producer.

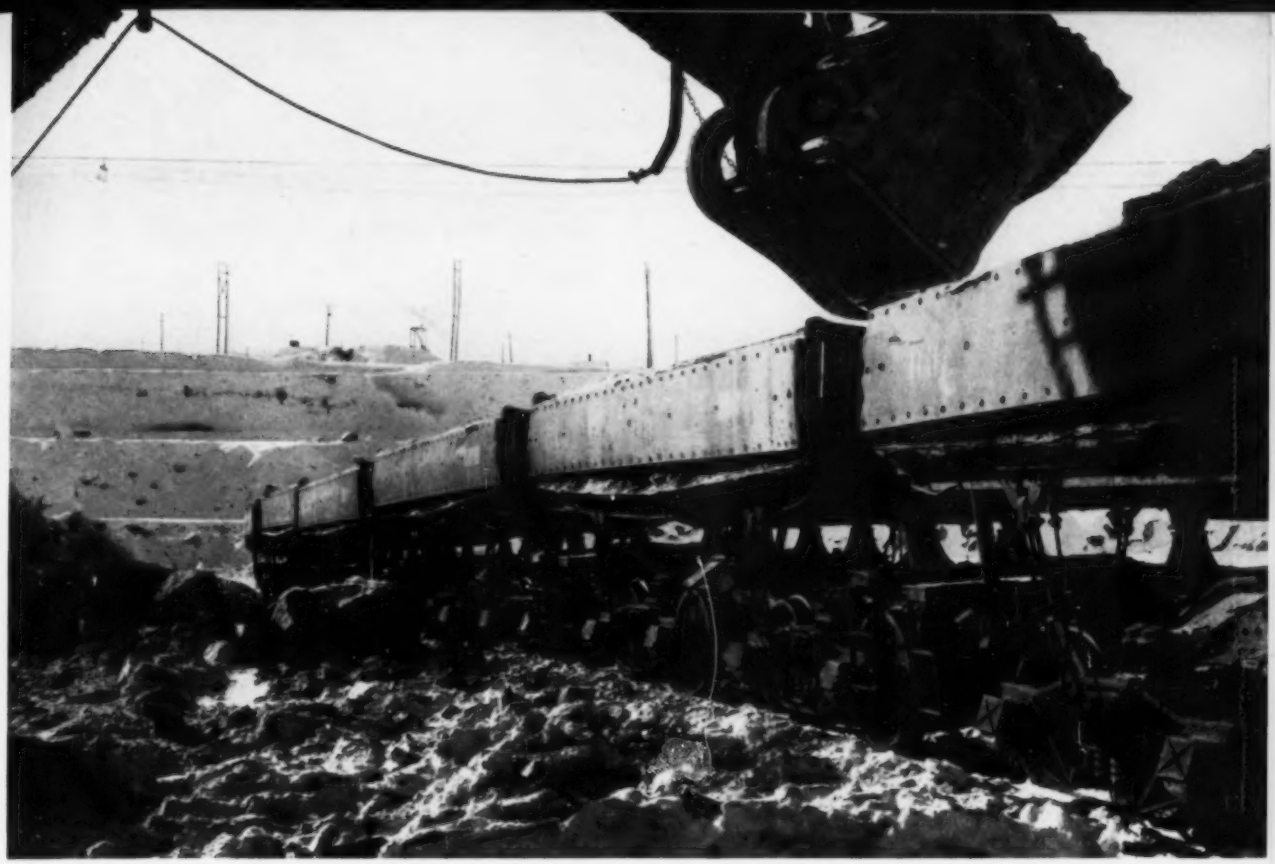
Through all the activity there is the paramount consideration of safety-first, and the prevalence of injuries in slides or blasting or other operations of the early days has given way to a modern regime where hazards are eliminated by planning, modern methods, and safety education. Injuries are neither so numerous nor so serious as they used to be. "In the old days" says Dr. R. H. Stevenson, veteran surgeon in charge of the Company hospital, "There was an accident ratio of possibly 87 per cent, in a year. Now it is about 20 per cent, even including the slightest injury throughout the year. Sudden deaths, fortunately, seem to be a thing of the past."

Every employee of the mine, as well as those in mill and factory, is required to take an X-Ray examination at least once

Good example of blast in the pit.

Early stage of quarrying for asbestos, about 1900.





Loading ore into 20 cu. yd cars with the dipper of an electric shovel.

The "hill" has almost disappeared.

a year, just as a precaution against possible dust diseases. The incidence of tuberculosis among workmen, remarkably enough, is less than among the general population.

Electrification was a big step in the progress of mine operations. Cables and towers carry the power into the pit, and among other outlets for it are the huge electrically powered shovels. Particularly proud are mine men of their new electric shovel with a capacity of 8 cubic yards in one bite. This massive unit of equipment weighs altogether about 700 tons, is self-propelled by power transmitted through the hoisting machinery to supporting crawlers, and its chief advantage is that it will be able to load material into cars passing along a level 65 feet above instead of into trains brought alongside. The length of the shovel's boom is 93 feet, and a man can stand upright in the dipper itself. The cab alone is so large that it would swallow up a couple of story-and-a-half houses. It is the largest power shovel to be found in Canadian industry.

This new unit is only one of many acquisitions resulting from the Company's million-dollar expansion programme recently undertaken to step up production of the Jeffrey Pit. Not mine equipment only, but mill and factory and railway units have been added. The railway was equipped with new yards and locomotives. Incidentally, this railway is a full-size regularly chartered line, with 25 miles of tracks. It is called the Asbestos and Danville Railway, and is used chiefly to move freight for the Company and the community, to move ore to the mill, and waste to the dumps. It connects with the Canadian National at Danville. As a result of the expansion program and a reduction in working hours the personnel of the Company was increased during 1937 by about 200 men.

It would be misleading to leave the impression that open-pit mining of asbestos as practised here is the only noteworthy method followed by the industry. There is, as mentioned before, the interesting variation of open-pit mining at Thetford, where in somewhat narrower workings the world's largest cableway-and-slip operation is conducted. In Cyprus and Siberia there are open pits, sometimes mined in primitive style and sometimes with various modern aids. In other countries some of the asbestos mining is underground.

The newest thing in underground work may be seen at Thetford-Mines, where the revolutionary method of "block caving" is being employed in the King mine. The ore is mined in large blocks by a system of stoping. A section of ore a few feet deep is broken out on a lower level over the entire area of the block. As support is removed the overlying ore breaks of its own weight or "caves" and this caving occurs at a fairly uniform rate over the whole section. The ore is conducted from the stope to a grating, where oversize boulders may be broken by hand hammers or blasting. Material then passes to a haulage level for loading into cars. The next block above is then caved, and so on. The advantage is that shoveling is eliminated and a large proportion of the ore is so broken by the fall that blasting is unnecessary.

Of all the rock in an asbestos mine, the Jeffrey Mine being considered as typical, a variable percentage goes to the dump as worthless. The remainder goes to the crushers and the mill. Pieces of asbestos-bearing rock weighing as much as several tons are often seen in the cars on the way to the crusher. In some of these the asbestos veins are conspicuous, while in others, the veins are small and the fibres almost invisible. All of the rock, however, is valuable.

In the primary crushers at the mill, great masses of rock slide into jaws of steel, to be crunched into pieces two or three inches in diameter. Then the rock passes through a battery of driers designed to remove moisture from the ore. It is then submitted once more to crushers, which reduces the size of the rock pieces still further. Finally it is stored in bins with a capacity of 25,000 tons, ready finally for the process known as milling.

The recovery of fibre in the milling process varies, but is in the neighbourhood of nine per cent of rock milled. Thus an engineer estimated that of sixteen tons of rock in the workings, five tons would be immediately discarded as valueless, and eleven tons would go to the mill. In the mill one ton of fibre would be extracted from the eleven. Hence it is calculated that more than 6 million tons of rock had to be mined and 4,500,000 tons milled, to obtain Canada's 1937 output of 409,000 tons of fibre.

In order to mill out a ton of fibre from eleven tons of mill rock, a complicated process of separating the fibre has to be undertaken. It is a process which has gained much in technical detail since the

early days but which is substantially the same in principle. There is a series of crushing or fiberizing stages, after each of which a collector operated on the exhaust fan principle picks up liberated fibre. First fibres collected are the spinning fibres, best grade of milled asbestos and second only to the "crude" handpicked after the blasts. This is worth in the neighbourhood of $100 a ton and its chief use is in woven fabrics, principal of which is brake linings for automobiles. Next best grade of fibre collected is used in manufacturing high grade insulation. Next comes so-called shingle fibre, and then paper fibre, used as a base for heat resisting papers for a multitude of uses. Lowest grade collected from the milling process is the short fibre, worth in the neighbourhood of $15 a ton but useful in many products.

A recent development in milling is the effort to adopt uniform grades throughout the industry. At the instance of the Quebec Government the Quebec Asbestos Products Association was formed to define the various grades. There were hundreds of grades and sub-grades, but the chief groups are now well-defined and standardized throughout the Quebec Asbestos producing area as a result of the combined action. Special test-boxes with screens of a certain mesh are used to measure the component fibres of the various grades.

Besides mine and mill at the Canadian Johns-Manville property (the Jeffrey Mine) there is also a factory. This company is the only one in the country which manufactures a part of its fibre right at the mine into a wide range of asbestos products for use in industry. Another manufacturing plant is situated within 100 miles of its mine, but other producers sell their fibre to distant manufacturing companies in Canada or abroad. The Johns-Manville factory uses a large tonnage of fibre from the mine, a stone's throw away, in the fabrication of packing, shingles, roofing paper, pipe covering and brake lining. The processes in the factory are of the highest interest, but to describe them adequately would require a volume of their own.

It is worth noting, however, that as soon as asbestos fibre gets to the manufacturing stage it attracts to it, like so many other Canadian primary materials, a stream of products from other industries. Asbestos, therefore, in addition to throwing its own considerable weight into the scale of Canada's trade, also creates a substantial market for other materials.

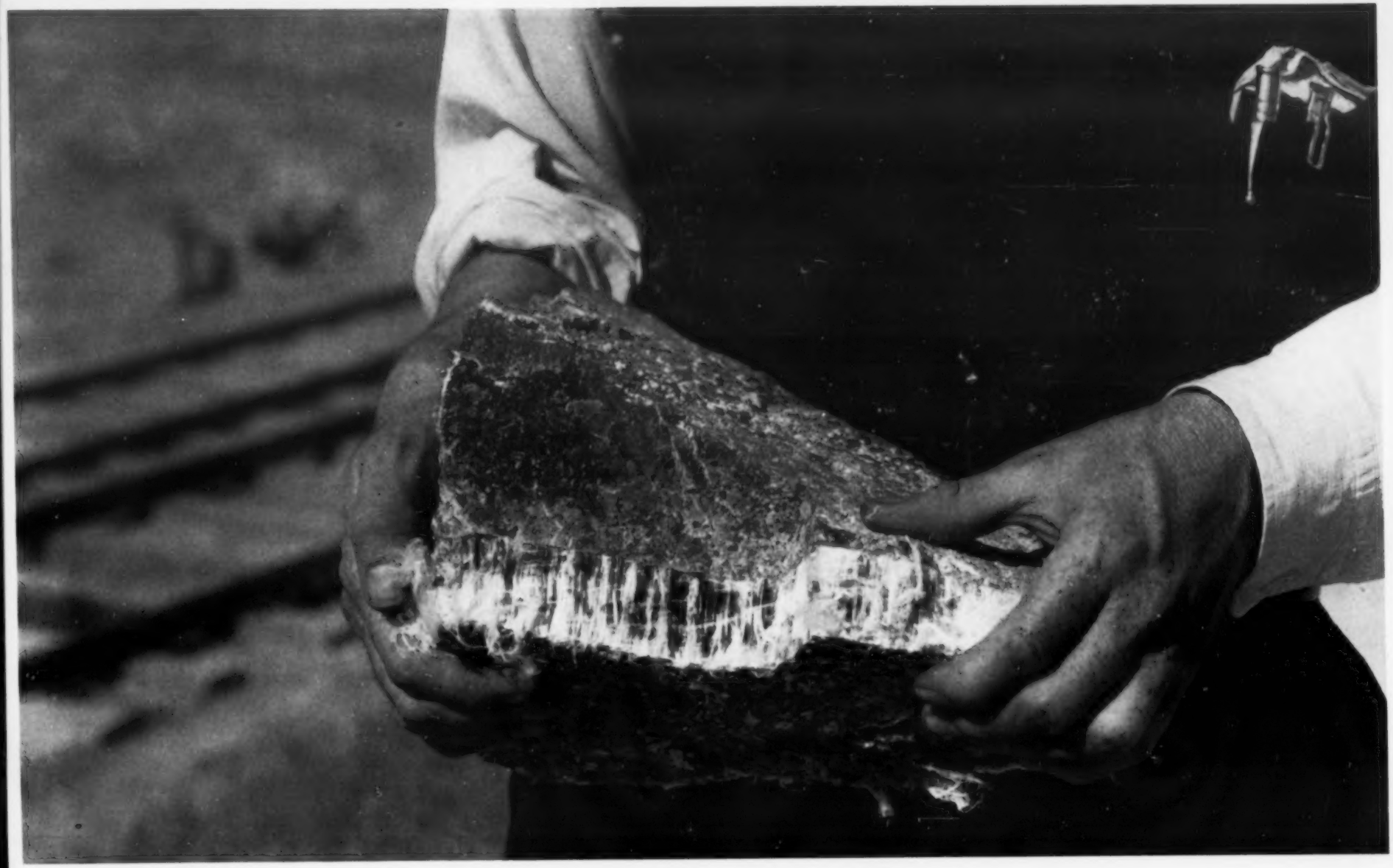
There are five other chief companies in the business of mining asbestos in the Quebec area. They are Asbestos Corporation, Limited at Thetford-Mines; the Johnson's Company, at the same centre; the Bell mine, owned by the Keasbey & Mattison Company, also at Thetford-Mines; Nicolet Asbestos Mines Ltd., Norbestos, Que.; and the Quebec Asbestos Corporation Ltd., East Broughton, Que.

Canada's entire production of asbestos fibre for 1937 was 409,000 tons, valued at almost $13,000,000. In 1929 the value of the total tonnage produced was $13,172,000. That was about 70 per cent of the world's production. The Jeffrey Pit alone has sometimes produced about 40 per cent of the Canadian annual total. In other words the output of the old cherry ledge on the Webb farm has been as high as 28 per cent of the world's total.

The other producing countries of the world, in order of importance, are Southern Rhodesia, Russia, the Union of South Africa, Cyprus and the United States.

This silica used in the manufacturing of pipe covers is an example of products which Johns-Manville buys from contributing industries to the value of $1,000,000 each year.

Hand-cobbing the "crude". Chunks of serpentine, with veins of all sizes, are shown in the foreground.



A chunk of serpentine rock with an excellent vein of asbestos fibre showing.

Asbestos — the mineral paradox — dense as the rock in which it occurs, yet actually a mass of silky fibres; the link, as it were, between the vegetable and the mineral kingdoms— at once crystalline and fibrous, heavy as stone in its crude state, yet light as thistle-down when mechanically treated; each delicate fibre an enduring barries against all the forces of nature. In this specimen of crude asbestos, its fibrous nature is clearly apparent as the pieces are pulled apart.

The town of Peace River, Alberta and its environs.

Courtesy C.P.R.

Past, Present and Future of the Peace

by **W. D. ALBRIGHT**

BEYOND the Athabaska, which is beyond the Saskatchewan, flows a famous river, whose name is a lure, whose majestic beauty a lodestone and whose region a romance.

Known to the Indian as the Unjigah (large river), the stream derived its present name indirectly from a treaty in which the invading Crees and the Beavers buried the hatchet at Peace Point on its lower reaches.

Born of two mountain-trough feeders converging head-on at Finlay Forks, British Columbia, the river has conquered the Rockies with a cavernous gorge. Issuing at Hudson Hope, it ploughs through the Alberta Plateau, describing on the map an italicized "S" and meeting in a low, marshy region the effluent of Lake Athabaska to beget the Slave. Its delta is now included in the Wood Buffalo Park.

Eight or nine hundred feet deep near the mountains, the canyon tapers out as the plateau declines northeastwardly against the tilt of its bed rock, and at Vermilion Chutes the river tumbles over the shoulders of limestone ledges, somewhat as Niagara does above the Falls. At the Chutes and in the Canyon great water-powers await profitable demand. Throughout the rest of its 807-mile trunk the current flows strong but deceptively quiet. A 580-mile stretch is navigable without portage.

Fifty-three Prince Edward Islands could be tucked away within the watershed of the Peace. Of its seventy-four million acres thirty-one and a half million lie in British Columbia, the rest in Alberta.

East of the Rockies the plateau has a ruling elevation of between two and three thousand feet, declining to around eight hundred at the low escarpment creating the chutes. The gingerbread tableland is deeply cut by the larger tributaries, while mere rivulets carve gaping gorges in steep descent to the river beds. The canyons drop abruptly from conspicuously even rims. Breath-catching are some of the river-scapes. Never to be forgotten is the junction of the Smoky and the Peace viewed from the hills southeast of Peace River town.

In certain of the settled regions wonderful panoramas fill the eye as the graded highway climbs gradually for five or ten miles to surmount a rounded crest ere sweeping into another broad, willow-etched, poplar-dotted vale. From the air these regions appear a vast garden planted by the Creator's hand.

Eighty-five or ninety per cent of the non-mountainous area is forested, chiefly with poplar and spruce, although willow, alder, lodgepole and jack pine, tamarack, birch and a few other species occur. Patched on the map are those choicer agricultural zones, where windsweep, sub-humidity and rich soil have favoured the prevalence of grass, holding the forest to bluffs. Beyond are the wooded hills, one range rising to an altitude of 3,600 feet.

How did Nature make such a country? The stamp of the glacier is upon it. Most of the best of the agricultural soils are believed to have been laid down under post-glacial lakes, long lobes of which extended from the Keewatin front up the present courses of the main rivers. Sloughs and muskegs are often remnants of old lakes, ponds and abandoned river channels. The beaver has been active. Geological history unfolds as one studies a country from the air.

So does climatic history. Where but in a dry climate would cutbanks one or more hundred feet high stand without reinforcement? In what humid climate would the sun-kissed north banks be largely grassed while the south banks were wooded? Aridity and windsweep favour the spread of wild fires. These periodically subdue the forest and give the grass a chance to grow. Spruce often predominates on eroded uplands, with jackpine on sandy ridges and some tamarack in the swamps. Poplar parkland is restricted chiefly to the richly mantled belts, particularly those where the sun shines its brightest and the Chinook wind blows its warmest breath. Keep fire, ax and plough out of the country and scarcely any of it but would run to trees.

Fur, adventure, religion and gold largely discovered the Peace. Joseph Frobisher and Alexander Henry, Sr., heard of it in

1776 from Indians at Isle à la Crosse. Sir Alexander Mackenzie records that the first white traders saw it in 1786. The next year he sent McLeod and Boyer to the Peace and in the following autumn a trading outfit was despatched to Boyer's place, thought by J. N. Wallace, author of "Wintering Partners of Peace River" to have been about the site of the modern Fort Vermilion, or just above it. There in 1788, Mackenzie records, a small garden was planted. Such was the part of fur. Fur traders figured prominently for the next century or more.

In 1792-3 Mackenzie wintered at Fort Fork, above the junction of the Smoky and the Peace, pushing on the next spring to the Pacific. That was adventure.

Fur and adventure led on Finlay, Fraser, Thompson and many other stalwarts of the "Northwesters." Dunvegan is thought to have been established in 1805 by Archibald Norman McLeod. David Harmon's diary mentions remarkably fine barley harvested there on July 21, 1809—128 years ago! Potatoes and other garden stuff had been planted in 1806, as they evidently had been at Forks Fort.

Horses were used at Dunvegan as far back as 1806 hauling logs for the palisades. Progeny of cattle taken to the Selkirk Settlement eventually found their way to the Peace. By 1839, if not earlier, they had arrived at Dunvegan and horses had then become plentiful. In 1840 three kegs of butter were shipped from Dunvegan to Chipewyan; the next year, eight kegs. Traders' tastes were becoming sophisticated. Vegetables, barley for soup making, cattle for milk, butter and beef, horses for work and trade were husbanded by the traders from an early day.

Missionaries followed the traders. The Roman Catholics seem to have been first. Difficulty has been encountered in tracing the inception of their horticultural and agricultural effort, but when the first Anglican Missionary arrived at Dunvegan in 1881 he found he had been preceded by the Roman Catholic Mission, then in charge of Rev. Father Husson, who had with him Father LeSerrec and Father La Treste. Dunvegan was then quite a rendezvous of the Indians, who used to have a hundred teepees at times.

In 1888 Father Husson established a mission at the mouth of Strong Creek and in 1893, after he had been joined by Rev. F. Le Serrec, he transferred to the site of the present St. Augustine Mission on the flats some miles upstream from Peace River Crossing. Brother Mathis joined the Mission in 1893 and continued in charge of the farm operations. Gardening was marvellously successful and crops have succeeded except in four dry seasons. A flour mill powered by a windmill was erected in 1895.

Anglicans left a deep impress on the early agricultural history. Rev. A. C. Garrioch became a resident missionary at Fort Vermilion, (Lat. 58° 22′ N.) in 1875. An Indian training school was established and in 1883 E. J. Lawrence, engaged by the famous Bishop Bompas, went from Quebec to teach in it. Two years later he was joined by his brother Henry as farm instructor. The latter's wife and eight children arrived the next year, when farm stock, equipment, boiler, engine and saws were freighted by oxen three hundred miles from Calgary to Athabaska Landing, by York boat to Slave Lake (later Grouard), on the Lesser Slave, bush trail 85 miles to Peace River Landing, thence 280 miles downstream by raft. A small grist mill was taken in by a partner of E. J. Lawrence.

Henry Lawrence commenced farming for himself in 1887 and his eldest son, Sheridan, became the big farmer, rancher, miller and "free" trader of the Fort Vermilion district, marrying the only daughter of Archdeacon Scott and raising a family of fifteen children, who at one time contributed the exclusive pupils of a public school taught by an elder member of the family.

Sheridan recalls that on his arrival at Fort Vermilion in 1886 there were about eighty head of fairly good cattle owned by the Missions, "the Company" and its retired servants. For the next few years most of the grain raised was barley, then on the older land some oats and Ladoga wheat, then Red Fife, Marquis and earlier varieties.

In 1881, under the auspices of the Church of England Missionary Society, an Englishman, Rev. J. Gough Brick, went to Dunvegan and a couple of years later was joined by two sons, who established them-

LEFT:—Top—Typical view of the grain fields within the Peace River Watershed.
Center—Mr. and Mrs. Herman Trelle on their farm at Wembley, Peace River section of Alberta. Courtesy C.N.R.
Bottom—Trelle's oats, double champion winner at Chicago in 1926. Courtesy C.P.R.

selves at Old Wives Lake on the plateau, where cropping proved none too successful. After two years spent raising funds in Eastern Canada and England, Rev. Brick returned to the Peace in 1888 with a fairly complete farming and milling equipment, establishing the Shaftesbury Mission farm at a point about twelve miles upstream from the present town of Peace River. There he and his sons raised wheat, a bushel of which, without handpicking, was awarded a silver medal at the World's Columbian Exposition, Chicago, in 1893—first of six world wheat championships to come to the Peace. Thus the part of religion in discovering agricultural resources.

A number of gold seekers like "Twelve-foot Davis," who lies buried on the heights overlooking Peace River town, trickled across the mountains from the interior of British Columbia but a more important factor were the stranded overland Klondikers, in the van of which were Geo. McLeod and Jim Brooks, who with a partner apiece made a camp on the Beaverlodge River and during the winter of 1898-9 rounded up scurvied disconsolates by two's and three's until a dozen souls were assembled in a "scurvy camp," where they had a terrible experience until taken where they could get potatoes and fresh vegetables. In a region where many suffered and some died for the want of a few fresh vegetables, the writer in 1936 ate tomatoes ripened in his own garden from the end of July till late in September, and green corn for weeks after August 12.

Prominent among the old timers was William English, who with his fellows wintered in 1898-9 south of the present town of Grande Prairie, living successively on lean horse meat, on muskrats and on fish. Afterwards with a partner out of a survey party he operated at Spirit River a ranching, farming and trading enterprise under the name of English and Calkin. Spirit River is a Chinook-fanned prairie town ten or twelve miles southwest of Dunvegan and became the theatre of the earliest successful agriculture on the plateau, as distinct from the river flat. Here lived the late Charles Bremner, an Orkneyman, who served "the Company" for 12 years, during which he had charge of a small herd of cattle, including four purebred Aberdeen-Angus sent to the Dunvegan post about 1888. Some three years afterwards he and his fellow Orkneyman, Peter Gunn, bought the whole herd of 45 cattle along with 25 horses. From about 1900 until his death he ranched and farmed for himself with never a failure.

Reverting to the Klondikers we find Alex. Monkman, of Selkirk stock, who turned back at Dunvegan and the next summer was sent from Slave Lake by the fur traders, Bredin and Cornwall, to establish a post at Lake Saskatoon, where he planted Early Rose potatoes in 1901, oats in 1902 and plots of oats, wheat and barley as well as potatoes in 1903. Within a mile of Monkman's old post lives Herman Trelle, four times World Champion in exhibition wheat.

Bredin and Cornwall did much to encourage agriculture and settlement, cutting roads, promoting cropping, distributing live stock and advertising the resources of the region. Bredin and Monkman still live in the Peace. It was Monkman who in 1924 guided Murray Hill, the Canadian National Railway engineer, through a detour of the Wapiti that is known as the Monkman Pass. This past summer he led a party of axmen cutting a third of a 132-mile trail from Grande Prairie district to Hansard through this same pass with a view to interesting governments in providing the Peace with a short-cut highway to the Pacific Coast. This trail cutting is a settlers' enterprise, mooted and financed almost wholly by farmers. In an age of paternalism it is a refreshing example of self help and initiative. Good progress has been made.

Space denies mention of the thousands of adventurers, traders, explorers, government officials, tourists, preachers, priests, ranchers and trappers, homesteaders and bonafide settlers who had a share in opening up the Peace but the gold lure of the Yukon played no small part.

"Some day these plains will all be occupied by settlers," prophesied Rev. J. Gough Brick, sweeping his hand around the horizon.

"Not in our day, father, not in our day," protested his sons. All around them they had seen land, land, land—hundreds of miles of it. It was far from steel and on the

Right:—Top—High Prairie School, Alberta.—Courtesy C.P.R.
Center—Old Anglican Mission at Shaftesbury Settlement about 12 miles upstream from the present town of Peace River. Here the Chicago 1893 Silver Medal Wheat was raised. Photographed by the author September 25, 1931.
Bottom—Early's Cattle, Peace River, Alberta.—Courtesy C.P.R.

plateau summer frosts were bad. When after the war Capt. A. L. (Fred) Brick, now with the Soldier Settlement in Edmonton, crossed the divide from Spirit River to Grande Prairie and beheld from that magnificent look-out homes dotted in all directions, emotion almost over-powered him. The vision of his father had come true.

The first considerable wave of settlement began in 1909, when some settlers trekked 550 miles from Edmonton with ox teams. The movement swelled until 1913; slackened during the war; grew rapidly for the next two years; reversed during the droughty depression of 1921-25; took heart again when the Grande Prairie district's bumper crop of 1926 coincided with Trelle's double championship at Chicago; rose to a new crescendo during the next few years but was only saved by government relief from a severe back wash during the depression period, when transportation costs, cutting a horizontal slice out of deflated world prices for grain and live stock, sent wheat down to 20 cents a bushel, hogs to 2 cents a pound and eggs to 3 cents a dozen. Economic cataclysms bear hard on remote frontiers.

Escaping the drought of 1936, the Peace harvested a big crop of fair quality. Prices rose and spirits rebounded with enthusiasm. Salesmen in the dried-out districts made a bee line north. The year 1937 opened auspiciously with a good reserve of autumn moisture. Prolonged dry weather ensued but again the crops demonstrated capacity to stand by for long periods of drouth, taking advantage of moisture when it comes.

Tourists remark on the developed appearance of the country. Over a hundred elevators sentinel the railway sidings. Schools, churches and hospitals abound. Every community has its sports day. Winter entertainment includes amateur theatricals. Radio brings world culture to the settler's fireside.

A forked railway serves the country. Built by the late J. D. McArthur it reached Grande Prairie in March, 1916, was operated by the Canadian Pacific Railway from July, 1920, until taken over by the Alberta Government on November 10, 1926. It was disposed of to the Canadian Pacific and Canadian National Railways jointly on July 1, 1929, and has since been operated as part of the Northern Alberta Railways system. With one branch extended by stages to Hines Creek north of the Peace and the southern one to Dawson Creek, British Columbia, the rail track from Edmonton north-west now totals 641.2 miles. Sir Edward Beatty promises that this summer a branch north from Grimshaw towards Fort Vermilion will be surveyed.

But the Peace looks to the Pacific and nothing but direct rail connection westward will satisfy it.

In 1924 the late Sir Henry Thornton promised that when it produced ten million bushels of wheat a year or its equivalent for three years in succession it would be entitled to a Coast outlet. For the best three successive years, viz., 1931-3, grain shipments originating on the whole Dunvegan line averaged 9,177,961 bushels of wheat and 12,506,944 of all grains. For the crop year ending July 31, 1937, shipments were 8,930,531 bushels wheat; 4,528,226 bushels oats; 617,244 bushels barley and 31,578 bushels flax and rye; totalling 14,107,579 bushels of all grains. About 86 per cent originated at points within the Peace River watershed.

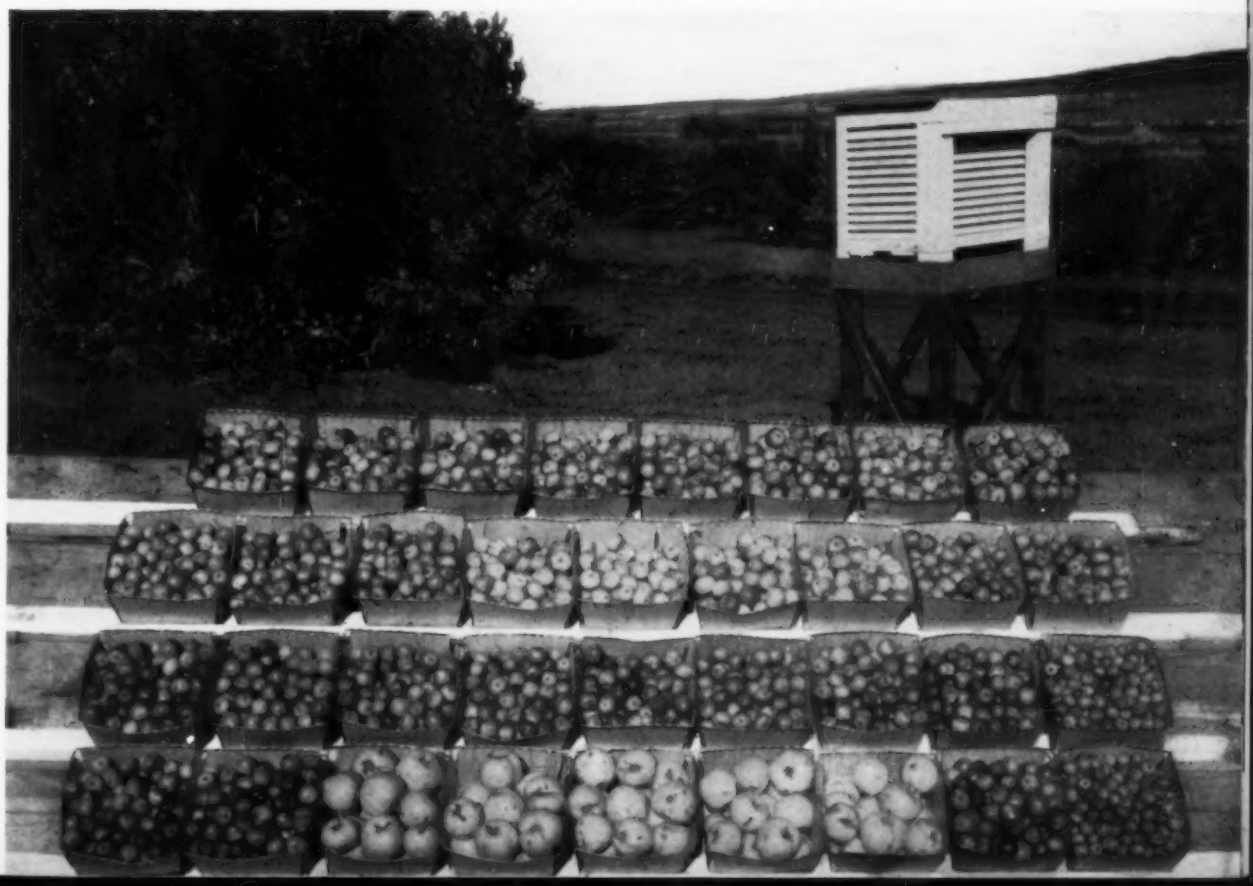
During the calendar year 1937 there were shipped over the Dunvegan lines 23,075 cattle, 76,240 hogs, 3,230 sheep and 600 horses. About three-quarters of these originated within the Peace River watershed.

And what says the horoscope? Whilst most of the best prairie and parkland has been already occupied, with far too many settlers wasting their lives on submarginal bush lands, a good deal of passable land awaits steel extension. Large areas of muskeg could be reclaimed by drainage, the feasibility of which has been well demonstrated. Some of the woodland soils would be counted good in other parts of the world and will be profitably tilled when economic conditions warrant. At a rough guess, pending more complete soil surveys, perhaps two million acres in British Columbia, and twelve to eighteen million in Alberta, may be ultimately farmed after transportation has been extended. By no means all the arable acreage will grow good milling wheat but the best malting barley and the best flax seed for commercial purposes are produced in the districts least suited to the production of high-protein wheat. All forage crops seed copiously and the Peace has boasted the biggest timothy-seed grower in the British Empire. The climate is salubrious for live stock although un-

Sweet corn and tomatoes, August 29, 1936. J. H. Crossley holding a basin of "Buza's Polar Circle."

Photos by W. D. Albright

Apples grown at Beaverlodge Substation in 1932, including speciman boxes of Blushed Calville, Osman (crabs), Beauty, Florence, N.E.S., Columbia and Olga.



adapted to cattle ranching and not especially productive of pasture or hay. Mixed farming, with grain and seed as leading cash crops, seems likely to prevail. The Peace is fast becoming the seed-oats area of the West.

Much is still to be done by the plant breeders, who have already done much Had no earlier wheat than Red Fife been available wheat production would have been very restricted on the plateau. The ideal wheat for the North is still to be bred. It is better served with good early kinds of barley, oats, flax and peas.

Sound public policy would confine settlement to the best districts, relegating large areas to forest and game preserves. Who knows but the tree may yet be our most profitable crop?

According to one geologist the whole of the Peace is underlaid with gas at high pressure. There are oil possibilities. Two great water powers have been mentioned. Vast coal measures lie above Hudson Hope and along the headwaters of the Smoky. The late Sir Donald Mann envisioned great mineral resources to the West. Most of the resources are so placed that development may be neither early nor easy but they will be utilized in time.

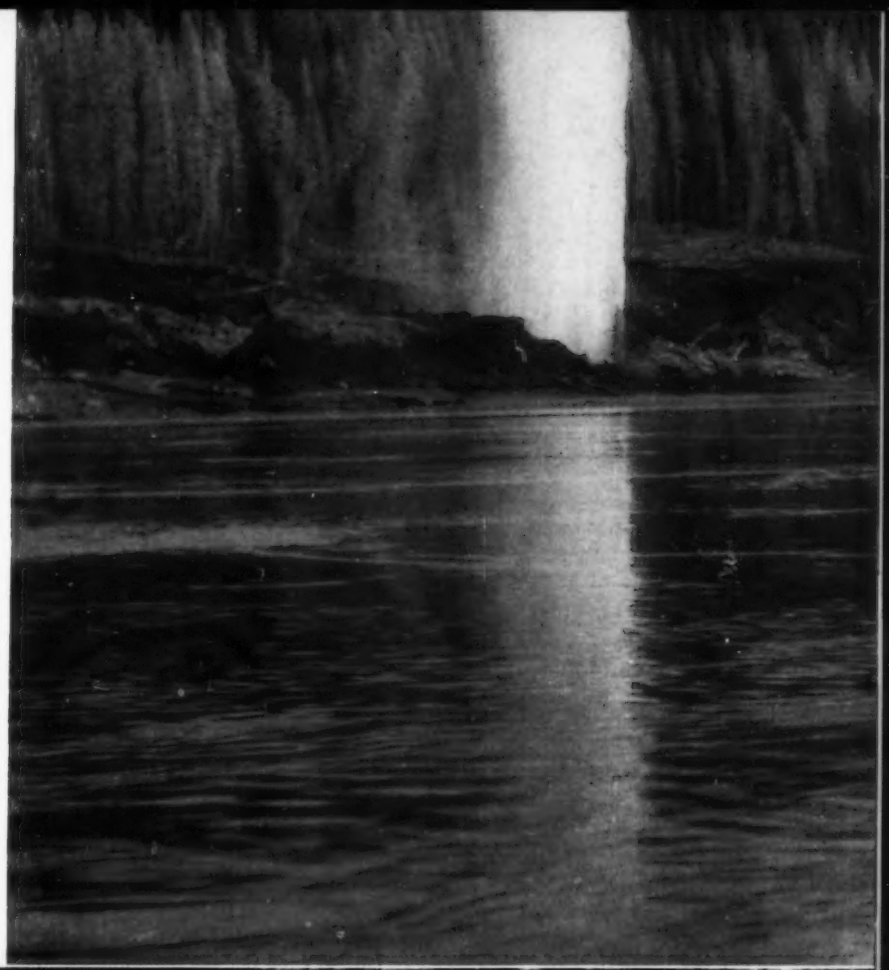
The destiny of the Peace is closely linked with that of the Coast Province, each complementary to the other. Highway and rail must open the front door to the Pacific. This done, some day the scenery of the Peace will prove a magnet for tourists and its seventy-four million acres may support more people in comfort than the whole of Alberta does today.

Filtered by the formidable difficulties of the trail, the first waves of settlers were the finest lot of people who could occupy a new country, English-speaking with few exceptions. The average is still good but a thoughtful observer sees more turnover than he might like. There is complaint of the long winters. The trail pioneers dwelt in tents or "jungled out" and were healthy. As warmer houses were built there was more and more disinclination to brave the cold, just as closely housed animals shiver from the blasts in which range stock revel. It is unlikely that man will resist the temptation to "go soft." Solution appears to be rather in adaptation. Better insulated buildings with floor heating, snowmobiles or aeroplanes for speedy transport on the occasional drift-piled winter roads, organization of farm work to avoid exposure to the worst weather are suggested. Habituation without coddling is required.

Ever as man has pushed poleward he has had to learn how to adapt himself to his new environment. Those who have solved the problem have become the selective, resourceful races of the earth. After 24 years' residence I am convinced the Peace will remain a white man's country, breeding the type of men who made her volunteers famous in the Great War.

"Twelve-foot Davis" was one of the "gold-seeker" pioneers of the Peace. His grave on the heights overlooking Peace River town.

Courtesy C.N.R.



The Peace River country is rich in oil deposits. An abandoned well.

Wicked River, Peace River Block, British Columbia.

Photos C.N.R.

Preston hybrid lilac Francisca, planted in 1930 at Beaverlodge Substation. Photographed July 6, 1933

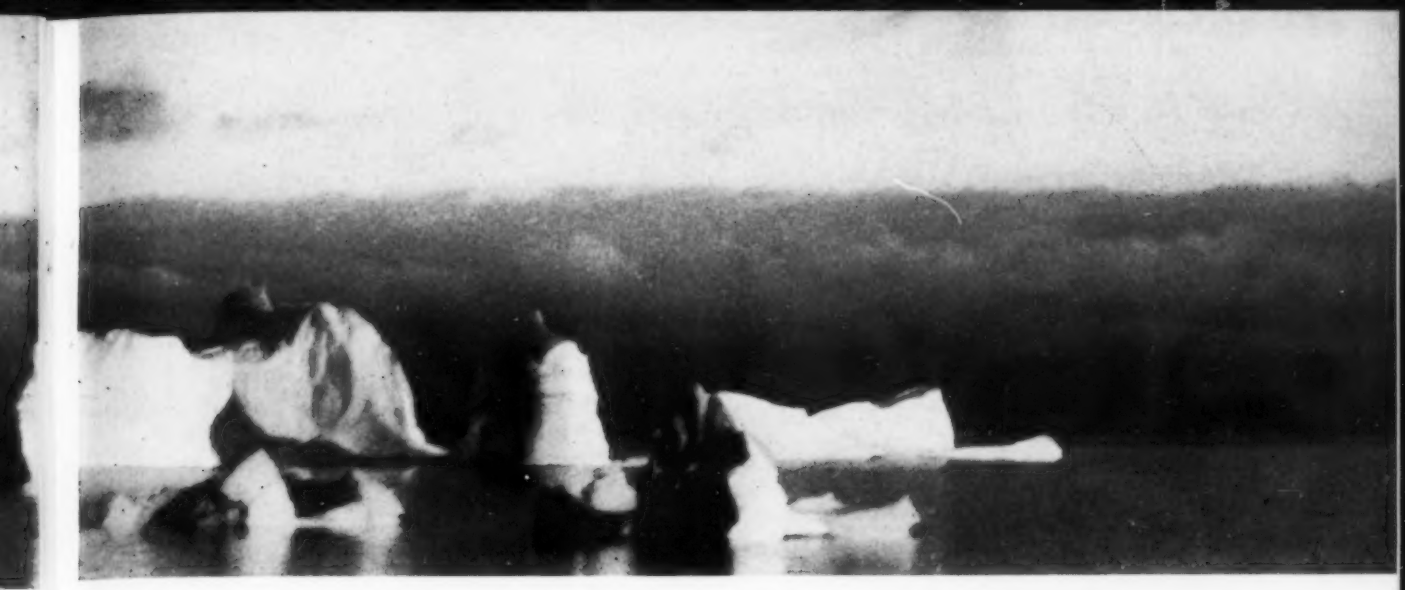
Photos by V. D. Albright.

Flower beds in front of greenhouse. Sweet Alyssum, bordering beds of Harbinger salvia in foreground, Dwarf bedding aster circular beds in Pink Gem petunia immediately in front of Crimson Bedder nicotiana, African orange daisies flanking dirt walk on extreme left. Photographed Aug. 25, 1936.

W. D. Albright.

Ryder's seedling dahlia of Coltness Gem type grown at Beaverlodge and proving extraordinarily floriferous. August 29, 1936.

From his study window Dr. Porsild, famous botanist, leading authority on the natural history of Greenland and Eskimo culture commands a view of the icebergs shown above.



SCIENCE IN THE SHADOW OF THE POLE

by **WILLIAM Q. KETCHUM**

FAR up on the icy roof of the world lies Disko Island, Greenland, where Dr. Morten P. Porsild has held ceaseless vigil for science for more than 30 years. Visits made by the writer to Greenland as historian of a Canadian Arctic expedition, led to meetings with this great savant whose study window looks out on a vista of icebergs. Two of his sons, Dr. A. E. Porsild, botanist of the National Museum of Canada and E. Porsild are both true sons of their father, and rendered great service to Canada in establishment of reindeer in the Mackenzie district of the North West Territories.

Greenland with its mountains piercing the clouds has an almost unbelievable beauty of earth and sky and water. Even when the swirling Arctic mists are veiling its face it has a charm all its own, for members of the Danish crown colony are the soul of hospitality.

Dr. Porsild is relinquishing his post as director of the Danish Arctic station which he established in 1906. Even now he is in Copenhagen where he will spend the winter working on two monumental works. One of these is "Flora of Greenland," and the other "Seed and Reproduction of Arctic Plants." Next spring he will return to Greenland to wind up his work and install his successor.

The retiring director was the first to see Greenland as a great laboratory in which experimental research work might be carried out in biology, meteorology, glaciology and other departments of science. On returning from his first expedition to the country in 1898 he tried to persuade Denmark to establish a modest laboratory in what was to prove to be the field of his future labours. Seven years later, the dream came to fruition through the generosity of a public spirited citizen of Copenhagen, A. Holck.

The buildings and equipment were all that could be desired and in the course of time the Arctic herbarium expanded to such an extent that it contained more than fifty thousand sheets of plants. The library which received many contributions from Danish and foreign societies eventually required enlarging and now contains fifteen thousand volumes.

Shortly after the station was established the Danish Government took over its operation with Dr. Porsild as director. Since its inception the station has been visited at different times by noted scientists from almost every country in the world.

Dr. Porsild examining a specimen.

The fruits of their labours are represented by an imposing series of papers.

Why is Greenland such a happy hunting ground for the scientist? The answer is that conditions prevail today that are similar to those that existed in North America and Europe during the great ice age. Covering an area of 800,000 square miles, the island, which is the largest in the world, is practically covered by an ice-cap which in places is thought to be 4,000 feet thick. Only one seventh of the entire area is free of ice. It thus affords unparalleled opportunities for the study of problems, not only relating to glaciology and the probable cause of the advent and disappearance of the ice ages that geologists know have occurred in Europe and America during the Pleistocene epoch of the Earth's history, but also to a number of biological problems that have a direct bearing on how plants and animals (including the genus homo) were able to survive during the ice age.

Few people realize that Greenland, Canada's northern neighbour is a "closed country," which means that special permission has to be obtained from the Danish authorities to step ashore at Disko or any other point along the coast. The Danish Government maintains a monopoly of the trade and exploitation of all the resources of the country.

This is to protect the Greenlanders from victimization and undesirable contacts with white traders, prospectors and hunters out for quick returns. All the profits made through trade as well as royalties from the Greenland mines are returned to the country. They swell a consolidated revenue fund which is earmarked for the construction of schools, hospitals and for other purposes. When I visited Greenland I was amazed to discover that the Greenlanders have their own postage stamps, and also publish a newspaper which is printed excellently in their own language on fine paper. It is called "Avangnamiok," which means "the People of North Greenland," and has a circulation of more than 2,000.

The station where Dr. Porsild has toiled for so many years is situated a mile east of the town of Godhavn where the Danish Government operates a powerful radio station as well as a magnetic observatory and a meteorological station. As seat of the administration of North Greenland, its port is the most frequented in the whole vast area. The first boat calls in May and the last one leaves in October, but as a rule the harbour is open from April to December. The regular mail and passenger service between Greenland and home is handled by half a dozen government boats. For this reason it is necessary for all foreigners as well as for Danes, not connected with the Greenland administration, to obtain permission from the Danish Government to enter the country. Scientists, writers and painters are, however, welcomed when they have the necessary background and are recommended by their respective Governments. The only reason for excluding a bona fide visitor would be lack of accommodation on the boats.

People in Canada will be interested to hear that the flora of Disko is rich and varied, and that a great many southern plants, including four varieties of orchids, grown luxuriantly in the warm springs of the south coast.

Although a botanist, Dr. Porsild is generally acknowledged to be the leading

authority, not only on the natural history of Greenland, but on Eskimo culture as well.

Far removed from the absent-minded professor type, he knows how to build a house that will withstand zero weather and blizzards. Other accomplishments include the repairing of a delicate time piece or barograph and the making of dog harness. He applied modern methods of construction and reinforcement of materials to sled building, and today the "Porsild sled" is used exclusively by Greenlanders.

The regard in which the noted scientist is held by the natives was given practical expression when they made him the first Danish member of their parliament. He has been given acclamations at successive elections without making a speech.

When I visited Disko the parliament was in session, but a general holiday was proclaimed in honour of the Canadian Arctic expedition.

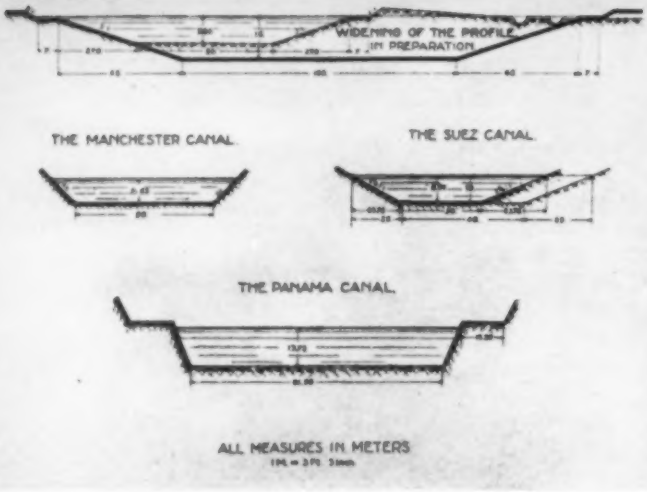
In Arctic countries it is not unusual, during the dark period, for highstrung persons to develop a special kind of dementia and run amok. The superstitious natives think the unfortunate individuals are possessed by the devil, and they are shunned and feared. In the old days in fact, primitive but effective measures were taken to dispose of them. Now as a rule these cases yield readily to bromide treatment, and when some level-headed person is about, the patient soon recovers. The native blacksmith got "queer," but was not considered really dangerous. His wife generally knew when an attack was coming on and got the necessary medicine from Dr. Porsild in time. One day, however, an attack came on unexpectedly. Seizing a rifle he set out for the scientific station, his random shots striking terror into the community. Intervention was considered suicidal, and he reached the entrance to the doctor's library unmolested.

The first intimation the scientist had of a visitor's presence was the ominous click of a rifle being cocked. Looking over his glasses, he saw the maniac with his rifle pointed at his head. "Naussorssiortoq are you ready to die for I have come to kill you" shouted the blacksmith. The doctor calmly puffed away at his pipe and then said: "Marti that is quite all right, I am ready to die, but before you kill me I wish you would help me to fix the lock on the front door. I have been tinkering with it all morning and was just going to send for you, knowing that you know so much more about locks than I do."

The blacksmith put down his rifle and said that he would be glad to do the work. When his task was finished he was quite normal. Meanwhile, as a precautionary measure, Dr. Porsild had quietly unloaded the gun.

Although he has spent the greater part of his useful life in one of the most secluded corners of the world, Dr. Porsild has gained wide recognition from his fellow workers and learned societies. He has visited the United States on a coast-to-coast lecture tour and has been in Canada twice. He was knighted by the King of Denmark in 1921. It will be a "long call" from his study near the "great ice" to the bustling city of Copenhagen. Wherever he goes science will be the richer for his presence.

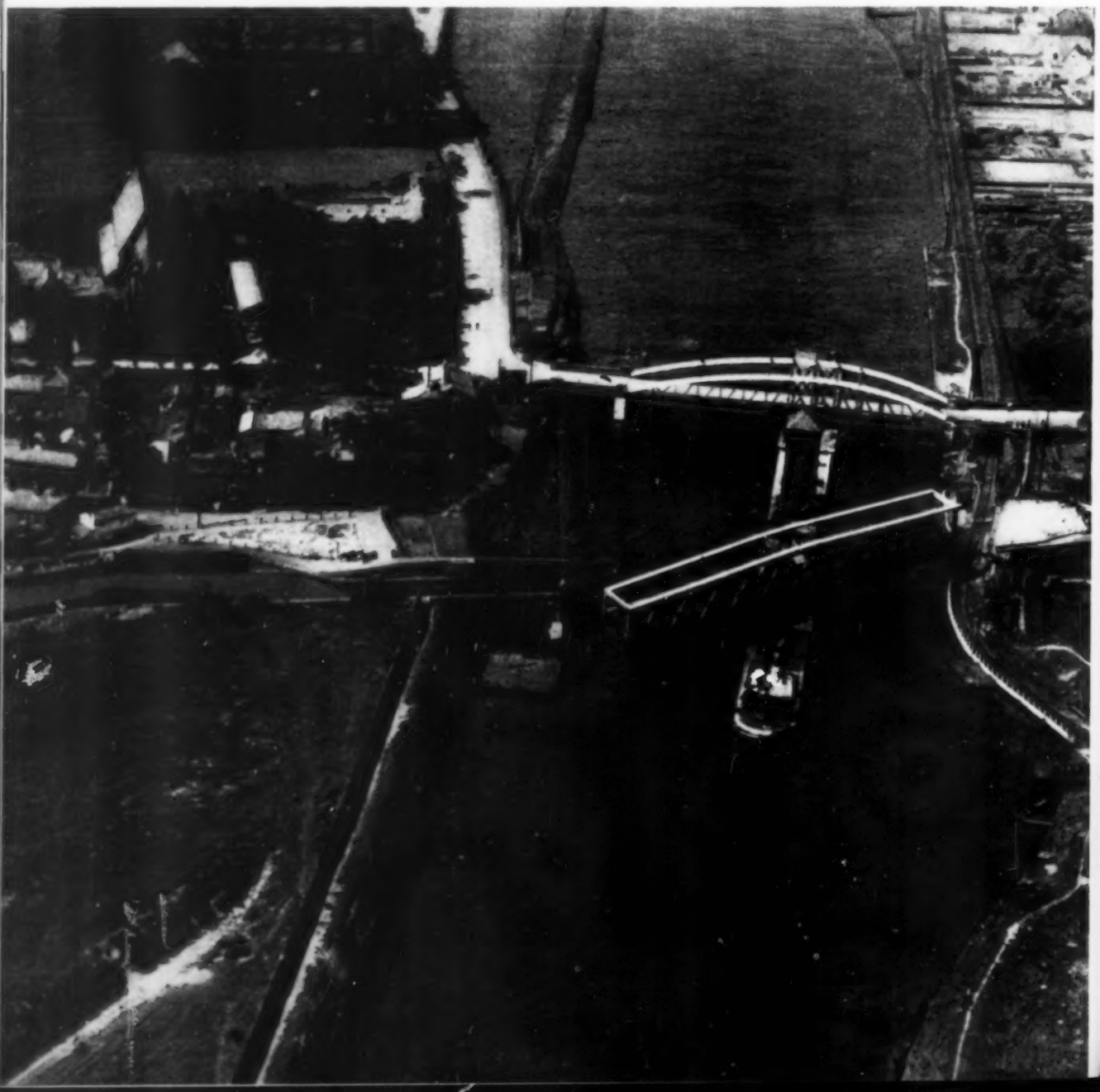
Danish Arctic Station at Godhavn, Greenland, established by Dr. Morten P. Porsild in 1905.



The four principal canals of the world, showing how the present widening will make the North Sea Canal the largest in the world.

Courtesy Municipality of Amsterdam.

Aerial view of Barton Aqueduct which carries the Bridgewater Canal over the Manchester Ship Canal.



SHIP CANALS OF EUROPE

by **H. E. M. KENSIT**

THE idea of raising a great ship, perhaps a thousand feet long and weighing tens of thousands of tons, to a height sometimes hundreds of feet above its starting point in a canal, is always impressive to both the mind and the eye, but there are also great "sea-level" canals that secure what are literally immeasurable benefits without any, or any considerable lift.

The countries of Europe give us examples of national benefit from ship canals that are not surpassed by anything we have in the western hemisphere, and some of these exceed in size or length, but not in both, the famous Panama, Suez and Welland canals. Many European canals are surrounded by remarkable conditions and bear romantic histories of national endeavour centuries before modern engineering made them possible. One saved its country from paying tribute to another nation for reaching its own capital by water. Another saved a great and wealthy city from commercial ruin. Another turned a great inland manufacturing city into a first-class port. Several have cut the travel required from thousands of miles to a tenth of the distance or less. One completed work that had been begun thousands of years before by the early Romans.

In nearly all cases the history of these canals has been one of continual increase of breadth and depth in order to accommodate the evergrowing size of ocean vessels, a necessity that has nowhere been more apparent than in the building of four successive Welland canals in our own country. Just now, when we are so busily thrashing out the proposal for a canalized waterway from the Great Lakes to the sea, it is not inopportune to look briefly at the great ship canals of Europe and see what they have accomplished for the countries that constructed them.

The North Sea Canal to the great city of Amsterdam now possesses much the largest lock yet built, and when the present improvements are completed it will be the widest and deepest canal in the world. The history of the city and its canal is more than a little intriguing. The chief and keenly competing cities and ports of Holland are Amsterdam and Rotterdam. The latter has easy access to the sea, but Amsterdam required 150 miles longer ocean passage, first northward and then south through the great inland sea called the Zuider Zee, a naturally shallow basin but sufficient for ocean traffic in the early days. Amsterdam has been famous through history for its sea-borne commerce and wealth, but towards the end of the eighteenth century the continuous silting up of the Zuider Zee made this port less and less accessible, and progressive diminution of the glories of Amsterdam appeared inevitable. Its subsequent history, however, well illustrates the courage and staying powers of the Hollanders.

The first effort to improve conditions was in the construction of the North Holland Canal to a point near the outlet of the Zuider Zee, but this proved inadequate to retain the sea trade. The present canal to the North Sea was then designed and constructed from 1865 to 1896, enlarged in 1921 and further improved by the building of the world's largest lock, opened in 1930. This new route necessitated the complete rebuilding of the port and all its facilities to face the North Sea instead of the Zuider Zee in the opposite direction, and incidentally it created at the junction with the sea the port of Ymuiden which has now grown to a city of 40,000 people.

This great ship canal, 16 miles long, is being completed to a bottom width of 328 feet and a depth of 49 feet, so that it will be much larger than the Panama or Suez Canals. A single lock gate weighs 1184 tons. It is called a sea-level canal though there is at times a difference of water level of 13 feet. The largest lock, 1312 feet by 164 feet, is exceeded in length by those on the Welland and Soo canals, but the space available is about four times that provided by any other lock. The harbour at Ymuiden can be entered at all stages of the tide, the canal is electrically lighted throughout and is navigable day and night throughout the year. The locks are operated from a central control room that receives the signals and can pass a ship through in 25 to 30 minutes. No dues are charged and Amsterdam is a free port.

The Corinth Canal, Greece, less than four miles long and with no locks, saves two hundred miles of exposed sea passage. It was commenced by the Emperor Nero but not completed until 1893, nearly 2000 years later.

Courtesy British Admiralty.

A mail steamer in the North Sea Canal, the waterway to the city of Amsterdam, that possesses the largest lock in the world.

Courtesy Municipality of Amsterdam.

Entrance to the North Sea Canal, sixteen miles from the great city of Amsterdam. The largest lock in the world, on the left, passes a ship in thirty minutes — a steamer can just be seen in the lock.

Courtesy Royal Institute of Engineers, Holland.

The completion of the North Sea Canal has made possible the reclaiming of the Zuider Zee, this adding 900 square miles of agricultural land to the area of Holland.

The North Sea Canal has fully justified the vision, enterprise and cost involved. It is used by between 4000 and 5000 vessels a year with a gross tonnage approaching 30,000,000. It has restored the threatened trade and prosperity of Amsterdam, now the largest and wealthiest city in Holland. It may be recalled that Amsterdam has been called "The Venice of the North." It is a beautiful city of unusual architecture, is built entirely on piles and is intersected by numerous canals. The streets are on the sides of these canals, but unlike Venice they are lined with quays for handling commerce, and these silent water highways are flushed out by the sea at every tide.

The Baltic-White Sea Canal, in northern Russia, of which the first section was completed in 1933, or as the Soviet Government puts it: "in the seventeenth year of the revolution," is now officially named the Stalin Canal. It is the newest of the European ship canals, and the means used for its construction are of peculiar interest. It will connect Leningrad, on the Gulf of Finland—that is on the Baltic Sea—with Soroka, on the White Sea, from which point the route is by that sea to the important port of Archangel. It will provide easy transport between the vast and varied natural resources bordering on the White Sea and the manufacturing district of Leningrad, now a city of nearly 3,000,000 people. The route round the Scandinavian Peninsula and by the long stretch of Arctic Ocean is 2840 miles. That by canal, interconnecting lakes and rivers will reduce this to 647 miles and the time required from 17 to 6 days.

The most remarkable features of this great work are, however, the method and speed of construction. As related in official publications of the Soviet Union the first section has been constructed entirely of Soviet materials and machinery by Soviet citizens, and without foreign consultation or assistance. The undertaking was done entirely under supervision of the famous O G P U, or secret police, and all the work, including professional, was done entirely by prisoners. The engineers who were "under the O G P U's care" were called together to make the plans. The other prisoners included murderers, thieves and bandits. All were given to understand that if their services were satisfactory they would be released or their sentences reduced. They were given freedom in their leisure hours and allowed to form and manage cultural and recreational clubs. During the progress of the work over 12,000 prisoners were pardoned, nearly 60,000 had their sentences reduced and "high honours" were bestowed on a number of the professional and other men who had rendered special services. As the Soviet authorities have put it: "the building of the canal was a real work of regeneration, not only of nature but of human beings."

And now as to the result of this policy. The first or northern section from the White Sea to Lake Onega, which included 140 miles of canal, the canalizing of the rivers and extensive changes to roads and railways, was started at the end of November, 1931, and completed in June, 1933, or in a year and seven months, a period that makes the construction of other great canals seem extremely slow.

It is estimated that in the first year of operation the Baltic-White Sea Canal will carry a million tons of cargo and that by the end of the second five-year plan it will be carrying ten million tons. It is planned to establish hydro-electric power stations and nearly thirty industrial enterprises along the route, and model villages are now under construction.

The story of the Manchester Ship Canal is one of the most striking romances of canal construction. The beginnings of Manchester, which is 35 miles inland from Liverpool, are lost in antiquity. It was a city before the Conquest and its churches were entered in the Domesday Book. It grew into a great manufacturing town that has been termed the cradle of modern industry, and as sea traffic developed it felt more and more the handicap of its inland location. It struggled with the problem of a canal to the sea for over a hundred years, but by 1894 this was accomplished in spite of many difficulties that included determined parliamentary opposition by the great railroad companies, and its sea-borne traffic has since increased from a trifling amount to over six million tons per annum.

The canal starts from Eastham, 6 miles above Liverpool, is 35½ miles long, with locks 65 to 85 feet wide and 600 feet long. The depth is 28 to 30 feet, and it is regularly used by vessels up to 15,000 tons. The

total lift is 58½ feet. It is owned and operated by the Manchester Ship Canal Company, but the municipality has a controlling interest therein, and the traffic now produces a revenue of nearly $7,000,000 a year.

While the principal docks are in Manchester, the canal is now practically an elongated harbour, for important facilities have been developed throughout its length. It forms an unequalled combination of ocean terminus and distributing centre. The company owns 200 miles of dock railway, eliminating dock cartage. There is direct connection with all the trunk railways and within a radius of 80 miles there is a population of over 16,000,000 people. So great is the efficiency obtained that ocean freights are now the same as to ports on the seaboard and through rates are quoted for imports and exports to all parts of the world.

Approaching this canal past the port of Liverpool one passes through a vast and impressive expanse of harbour up to Eastham Locks. Thereafter it passes through dead level country right up to Manchester, the route being lined with great industries on both sides, steel and heavy manufactures, coaling stations, etc., the whole country under a pall of smoke and fumes, black with coal dust and devoid of scenic attraction, but giving eloquent evidence of the approach to one of the world's greatest manufacturing centres.

The Trollhatten and Gotha Canals, of great length but not of great size, possess interest from their political necessity and from the greatness of the difficulties overcome. They completely cross Sweden from Gothenburg, on the North Sea, to Stockholm, the capital, on the Baltic, a distance of 240 miles. Before they were built, all sea traffic for Stockholm and other points on the eastern coast had to go through the narrow passage between Sweden and Denmark, called "The Sound," and had to pay onerous toll to Denmark. The conception of the Gotha Canal to render Sweden independent of Denmark dates back to 1516, but the great length of mountainous and granite-covered route and the lift of 300 feet (the Panama Canal surmounts only 85 feet) made the difficulties appear insuperable.

Two hundred years later, in 1716, a start was made and good progress followed, but the timber interests feared that the canalization of the Gotha River would hamper their business, and by releasing a vast mass of logs at an inopportune time they caused such devasting damage to the works that the whole project was abandoned. It was not resumed till 1793 and was completed 32 years later, or in 1825. The total length of 240 miles is mainly a series of rivers and lakes connected by 56 miles of canals. The total lift of 300 feet is overcome by 70 locks and at one point 9 consecutive locks give a lift of 150 feet. The route is through beautiful scenery, and the passage, occupying two and a half days, is considered one of the sights of Sweden.

The increasing size of vessels and growth of traffic later led to the enlargement of the first section of 85 miles from Gothenburg to the great Lake Vannern, a distributing point almost in the heart of Sweden. This portion was equipped with three contiguous, electrically-operated locks of 321 by 45 feet and 18 feet deep, giving a lift of 77 feet. It is now called the Trollhatten Ship Canal and the passage across Sweden to Stockholm is completed from Lake Vannern by smaller vessels on the Gotha Canal.

Nearly if not all capitals of countries have their own marked individuality, and Stockholm is no exception. It is largely built on a number of islands and is counted one of the most picturesque cities in Europe. On the central island are the royal palace, the church in which the kings are crowned and the cabinet offices. On another island are the Houses of Parliament, the archives and the law courts; another is the base for the navy; another has the zoological gardens, and so on. It is much the largest city in Sweden and the principal destination for imports.

The Kiel or Kaiser Wilhelm Canal is one of the best examples of enormous national advantages for commerce and defence, and of the saving of a long and arduous sea-passage, provided by a canal—so much so that it is worth studying on a large scale map. Before the opening of the first canal in 1895 all sea traffic for the Baltic had to take what ranks as the difficult and dangerous route round the north of Denmark and through the narrow passage between Denmark and Sweden, 240 miles longer than the route now furnished by the canal. It starts from the mouth of the Elbe River on the North Sea and crosses the Jutland Peninsula to Kiel Haven on the Baltic Sea.

Number 9 dock on Manchester Ship Canal showing number 2 grain elevator and pneumatic floating elevators.

Courtesy Manchester Ship Canal Company

The Baltic-White Sea Canal, the newest in Europe and to be the longest ship canal in the world. In addition to sea trade it will carry the vast natural resources bordering on the White Sea to Leningrad, now a manufacturing city of 3,000,000 people. A lock in the completed northern section of 140 miles.

Courtesy "U.S.S.R. in Construction."

The Kiel Canal in Germany, stretching for 62 miles from the North Sea to the Baltic Sea. This, with its eleven special "sidings", is the most spacious canal in the world and held the German fleet during the Great War.

Photo from "To Kiel in The Hercules" by Lieut. L. R. Freeman, Dodd, Mead and Company, New York, 1919.

It is 62 miles long and the new locks are 1082 feet by 147 feet with a depth of 46 feet—larger than those of the Panama Canal but not so large as that of the North Sea Canal. The Kiel Canal is a very spacious one. It is provided with eleven sidings up to 540 feet wide and 3600 feet long, with turning basins 1000 feet in diameter. It was completed in 1914, and furnished accommodation for the major part of the German fleet during the Great War. It is owned by the State, and under the Treaty of Versailles is now open to the vessels of all nations on the same terms as to German ships.

The Bruges Canal, built between 1896 and 1907, furnishes a ship passage from the harbour of Zeebrugge, founded at the same time, and famous because of the raid by the Allies in the Great War, to the city of Bruges, a length of six and a quarter miles. The lock at Zeebrugge is 518 by 65½ feet and 28 feet deep. The basins at Bruges connect with the extensive canal system of Belgium and the traffic is large.

The Corinth Canal, in Greece, is one of the most famous artificial waterways, and one of the best examples of a very short canal giving great benefit—the three and three-quarter miles of canal saves some two hundred miles of exposed sea passage. So obvious was its desirability that it was substantially started by the Emperor Nero to give better access to the city of Athens, and his work was fully utilized when the canal was finally completed between 1882 and 1893, nearly 2000 years later! The Isthmus of Corinth, at its narrowest part where it is cut by the canal, is less than four miles wide. It is mountainous country with a peak 4500 feet high, and the canal is cut through solid rock with banks rising to 240 feet. The breadth is over 80 feet and the depth 26 feet. It is highly scenic, has no locks, and when completed the canal and the mole afforded shelter and passage for vessels of nearly all sizes of that period, but the greater size of modern vessels and the building of a bridge that limits the height of masts to 114 feet now confine the traffic mainly to Greek passenger steamers.

Some of these ship canals of Europe are thus of notable size and possess many

The Inland Port of Manchester, 35 miles from the sea. This great manufacturing city has 16,000,000 people within a radius of 80 miles.

features of historic interest and engineering achievement. To get some idea of how they compare with the famous Suez, Panama and Welland Canals the main particulars may be tabulated in the following table:—

GREAT SHIP CANALS OF THE WORLD

	Dimensions			Lift in feet	Longest locks in feet
	Length in miles	Bottom width in feet	Depth in feet		
EUROPEAN					
Baltic-White Sea (under construction)	647	..	..	..	..
Trolhatten	85	..	18	77	321
Trolhatten-Gotha	240	..	..	300	..
Kiel	62	144	37	none	1082
Manchester	35	120	28	70	600
North Sea (ultimate)	16	328	49	13	1312
Bruges	6	72	28	..	518
Corinth	4	..	26	none	..
OTHER					
Suez	102	197	33	none	..
Panama	50	300	45	85	1000
Welland	27.6	200	27.6	327	1380
Sault Ste. Marie	1.4	150	1.4	21	1350

It will be seen that the Baltic-White Sea Canal in Russia will, when completed, be the longest ship canal in the world, but a large proportion of the total length is in lakes and rivers: the Welland has the *highest* lift and one of the locks is the *longest* in the world; the North Sea Canal has much the largest lock—in cubic capacity about four times that on the Welland Canal.

has a world-wide market, and as a distributing centre it has a tributary population of

Courtesy Manchester Ship Canal Company.

The Barton Aqueduct for barge traffic where it crosses the Manchester Ship Canal. This swing section forms a tank which is revolved full of water.

The Barton Aqueduct for barge traffic where it crosses the Manchester Ship Canal. This swing section forms a tank which is revolved full of water.

Entrance to the Manchester Ship Canal, at Eastham, near Liverpool. The Port of Manchester is 35 miles inland but commands the same shipping rates as those on the seaboard.

Courtesy Manchester Ship Canal Company.

Airplane View of the City of Glasgow, Scotland.

CANADA AND THE GLASGOW EXHIBITION

by **W. H. VAN ALLEN**

SCOTTISH influence and tradition are deeply and widely rooted in Canadian soil. Many Canadians today can point with pride to their forefathers who were among those hardy fur traders from Scotland who joined the "Company of Gentlemen Adventurers." The ancestors of others came to Canada with the Highland Regiments which helped garrison what was then only a Crown Colony and who took their demit here. Again thousands of Scottish families helped to pioneer first the eastern sections of the Dominion and later the Prairie Provinces. There is no doubt that the large proportion of Scottish blood flowing through the veins of the population of Canada has helped to create and maintain the particularly kindly feeling which exists between Scotsmen and Canadians.

Scotland this year is extending an official hand of welcome to Canada and all parts of the Empire in the form of an Empire Exhibition to be held at Glasgow between May and October. Canada, together with the other Dominions in the British Commonwealth of Nations, has accepted the invitation and will officially participate.

While the Canadian Government has officially accepted the invitation to take part in the Empire Exhibition, thousands of Canadians, with the love of the home of their forefathers in their hearts, are making arrangements to accept the added inducements extended by the Glasgow Exhibition to make 1938 the year for their promised visit to Scotland. Early indications reported by railway and steamship lines show an unusual amount of interest in the Land of the Heather, and already many passages across the Atlantic have been booked.

Canada is erecting her own pavilion at Ballahouston Park, where the Glasgow Empire Exhibition will be staged. The first sod on the site of this building was cut on December 8 by the venerable chieftain of the very old and honourable Scottish clan, MacKinnon. The chieftain is in his 90th year, and his presence lent dignity to the official ceremony of preparing the ground for the imposing looking building to be erected by Canada. Since then, rapid strides have been made in laying the foundation of the Canadian Pavilion and the building will be completed in

ample time for the official opening of the Exhibition in May by His Majesty, King George VI.

The Canada Building will be of modern design and in keeping with the general architectural scheme of the Exhibition. Provision has been made for adequate accommodation for a large number of individual Canadian exhibitors. The Pavilion will cover an area of 24,000 square feet. In designing this building, the Department of Trade and Commerce had to consider the fact that one of the main promenades of the Exhibition is along a hill which will overlook the Canadian Pavilion. Accordingly, the top view of the building will be as artistic as the front and side elevations. In the centre of the roof will rise a thin oblong tower boldly displaying the words "Canada" on its two sides, while abutments adjoining this tower will display the coat of arms of the Dominion. The building will be finished in a light creamy buff. The interior will be floored with Canadian wood and the walls and partitions will be lined with Canadian composition wall-boards.

Canada's participation in the Glasgow Exhibition will not be limited to the erection of a pavilion and the displaying therein of the products of Canadian industries and natural resources; neither will it be restricted to the large influx of visitors expected to cross the Atlantic from Canada. The products of Canadian forests, as well as other Canadian building materials, are playing a large part in making possible the erection of the various buildings. The fence, enclosing the 175 acres of Bellahouston Park, has been built of Canadian timber and the Exhibition authorities have adopted a firm policy of specifying Canadian timber for all construction in which timber is to be used.

The satisfactory progress of the Exhibition building programme has undoubtedly been facilitated by the foresight of Canadian officials in having large quantities of Canadian timber available to the builders from stocks maintained locally. Consequently, whenever the lack of immediate supplies of structural steel became a problem, as it did in the case of several buildings, the substitution of Canadian timber made it possible to avoid delay. Anticipating the need for much timber to be used in construction work, the Canadian Trade Commissioner in Scotland, with the co-operation of the Glasgow timber trade and the Timber Commissioners from British Columbia and Eastern Canada resident in Great Britain, made early arrangements to have large stocks of Canadian lumber on hand.

This year's Empire Exhibition at Glasgow promises to be the greatest held anywhere in the world since the famous British Empire Exhibition at Wembley in 1924. The Home Country will have her own vast pavilion. Canada, Australia, New Zealand, South Africa and the Irish Free State will each have their own building grouped along Dominions Avenue, which will be at once the most important and impressive avenue of the fair. Bordering an artificial lake, the avenue is situated near the main entrance. At one end of the avenue is being erected the Palace of Industry and at the other end, the Palace of Engineering. Along Colonial Avenue will be the pavilions in which the exhibits of the West African Colonies, Southern Rhodesia, the East African Colonies, Malaya, the West Indies and others will be housed. Scotland, as host to the Empire, will have a separate display, both in her two pavilions and in the village transplanted from the Highlands for the occasion. Separate buildings will be devoted to arts, music, sports, and to the many individual exhibits being displayed.

One of the features of the Glasgow Exhibition will be the Tower, rising 300 feet from the top of the hill within Bellahouston Park. From the top of this tower, a view far into the Highlands can be obtained, to the south the fertile fields of the Lowlands, or almost at one's feet, the teeming activities of the City of Glasgow and the famous River Clyde, birthplace of much of the Empire's vast mercantile fleet.

Only one hour's journey away from this observation tower lies Edinburgh, capital of Scotland, with history in every stone of its Old Town and Castle.

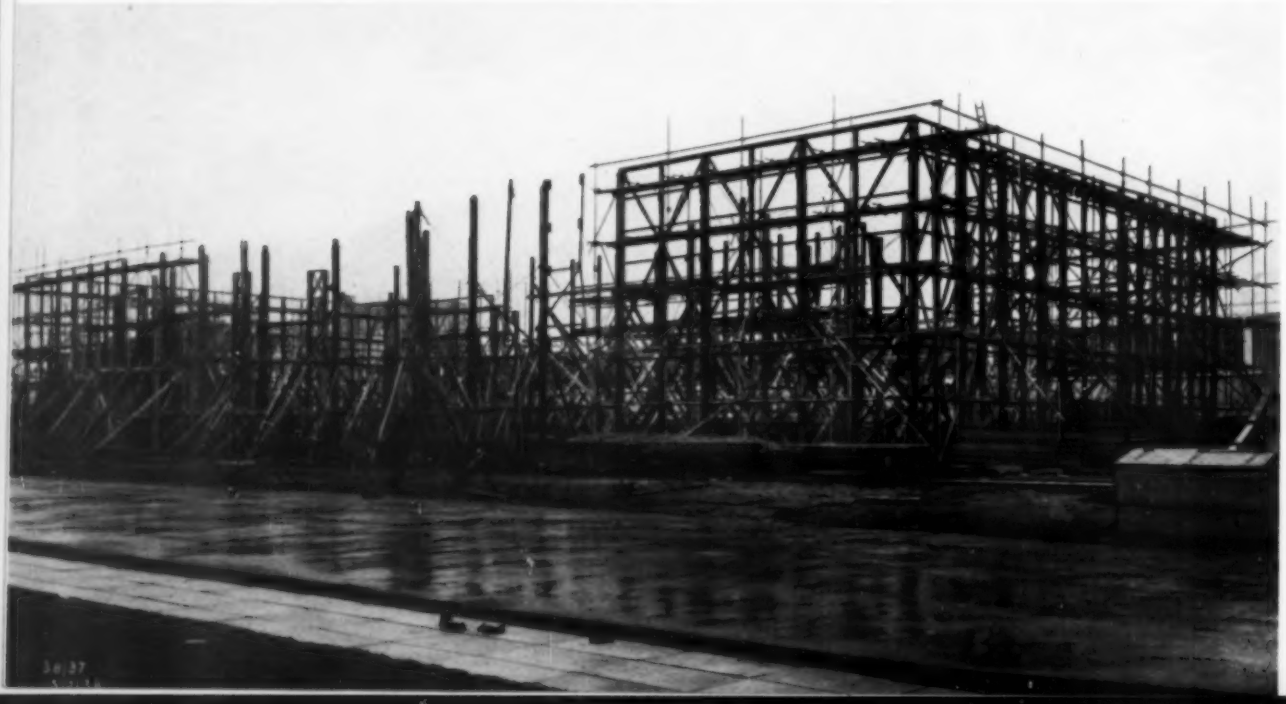
The vast panorama of Scotland, its Uplands and its Lowlands, are within easy distance of Bellahouston Park and the authorities, in an official booklet offer the suggestion that "Scotland invites you to make the Exhibition your touring centre this year, whether you are staying for a month or limiting your visit to a few days. In either case, the finest scenery in the country is within your reach."

The Highland Village, or Clachan, which will be of particular sentimental interest to all visitors of Scottish birth or ancestry. The village is an exact replica of the many Clachans located throughout the Highlands and was built by skilled crofters brought down specially from their native heath to ensure the accuracy of the minutest detail.

Thatching one of the houses in the Highland Village. The art of thatching has to a large extent been lost in the more populated centres with the introduction of modern roofing materials. Thatching is an art still practiced, however, in outlying settlements, and its secrets are handed down from father to son. Skilled thatchers were brought from their Highland homes to undertake this painstaking task.

The Chieftain's Castle, known as an Castel, which will be the meeting place of the clans at the Glasgow Exhibition. It was one of the first buildings erected and was used officially by the Chieftain MscKinnon of MscKinnon—who is in his 90th year—when he visited the grounds of the Exhibition on December 8 to officiate at the ceremony of turning the first sod on the site of the Canadian Pavilion.

The Canadian Pavilion in course of erection. This photograph was taken on February 5, one week after the work already accomplished had been destroyed by the 80-mile-an-hour gale which ravaged the coast of Scotland. In the one week all the damage had been repaired and construction work was further advanced than before the gale. The work is being rushed so that the building will be completed in ample time for the opening of the Exhibition by His Majesty on May 3.



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THE CANADIAN GEOGRAPHICAL SOCIETY

ANNUAL MEETING—1938

The Ninth Annual General Meeting of the Canadian Geographical Society was held on February 16, in the National Museum of Canada, Ottawa, Vice-President, Mr. Charles G. Cowan presiding in the absence from the city of the President, Dr. Charles Camsell. In his address Mr. Cowan stressed the steady increase in membership since publication of the Journal was taken over by the Society two years ago. He felt assured that soon the Society would be able to further extend its field of service through geographical research. Attention was drawn to the generous support, through special contributions, of several public-spirited geographically minded individuals and organizations chiefly connected with the mining industry; also the fact that such contributions together with a surplus of ordinary revenues over operating expenses were used to build up a necessary working capital reserve. Following a brief summary of several notable geographical achievements during the past year, in which the growing commercial utilization of airplane transportation was stressed, the speaker announced that the Society was sponsoring Mr. Harry Snyder's exploration work in the Upper Nahanni region and that a party would leave by plane in April to continue the scientific work requisite to supplying an accurate geographical map of this relatively unknown region.

Tribute was paid by the Vice-President to all those who had contributed to the success of the Society during the past year; with special mention of the Canadian press which had furthered the interests of the Society by devoting generous space in its editorial columns to commenting on articles published from month to month in the Journal. Mr. Cowan concluded his address by expressing appreciation of the sympathetic support of His Excellency the Governor General, Honorary Patron of the Society, who is himself an enthusiastic geographer.

Lieut.-Colonel G. L. P. Grant-Suttie, Chairman of the National Committee of Canada of the International Geographical Union, reported that the National Committee is functioning satisfactorily with the distribution of current geographical publications among its members.

Major-General A. G. L. McNaughton reported that a Museum of Survey Records under the National Research Council Associate Committee had been established and already valuable and historical instruments have been presented and preserved for posterity. He hoped that any members of the Society who had valuable instruments of historical importance would donate them to the Museum. A motion that the Canadian Geographical Society become associated with the Museum of Survey Research was adopted.

Under the By-Laws of the Society ten of the thirty directors are elected each year, serving for a three year term. Nine of the vacancies were filled by the election of the following; Dr. C. M. Barbeau, National Museum of Canada, Ottawa; Dr. A. Beauschesne, Clerk of the House of Commons, Ottawa; Honourable H. V. Bigelow, Regina; Mr. K. A. Greene, Ottawa; Mr. F. C. C. Lynch, Department of Mines and Resources, Ottawa; Dean C. J. Mackenzie, University of Saskatchewan, Saskatoon; Dr. D. A. McArthur, Deputy Minister, Department of Education, Toronto; Mr. E. S. Martindale, Department of Mines and Resources, Ottawa; Lciut.-Colonel Sidney C. Oland, Halifax. One vacancy remains on the Board which will be filled later in the year.

Immediately after the Annual Meeting the Board of Directors met and elected the following officers for 1938:

Honorary President, Dr. J. B. Tyrrell, Toronto; Honorary Vice-President, Dr. A. P. Coleman, Toronto; President, Dr. Charles Camsell, Deputy Minister of Mines and Resources, Ottawa; Vice-Presidents, Charles G. Cowan, Managing Director, British American Bank Note Company, Ottawa; Major-General A. G. L. McNaughton, President, National Research Council Ottawa; Lieut.-Colonel G. L. P. Grant-Suttie, Toronto; Honourable W. A. Buchanan, Lethbridge; Dr. R. C. Wallace, President, Queen's University, Kingston; Honorary Secretary, E. S. Martindale, Ottawa; Honorary Treasurer, K. G. Chipman, Ottawa; Honorary Counsel, O. M. Biggar, K.C., Ottawa.

RÉSUMÉ OF ANNUAL LECTURE

Delivered by Harry M. Snyder at the National Museum March 3rd.

Note: Cover subject — Snyder Mountains—provided through the courtesy of Mr. Snyder — exemplify the grandeur of this mountain range.

Canada's mountain heritage, rising within the southeastern section of the Yukon still clothed with romance and mystery, was portrayed in all its pristine glory by Mr. Harry M. Snyder, on March 3, when he addressed members of the Canadian Geographical Society in the National Museum of Canada on the subject of his exploration last summer through and over the Snyder Mountains. His Excellency the Governor-General, who is Honorary Patron of the Society, attended the lecture, and was greatly impressed by the remarkable beauty of the scenes depicted on the screen, and in particular those shown in natural colour. The concluding film, also in colour, was of special interest to those present, as it was taken by Mr. Snyder at Great Bear Lake only two weeks before, flown down from the Arctic Circle and processed at Rochester, N.Y., in time to be shown with others of Canada's great North West. It portrayed the dog races, now an annual feature with the miners extracting rich radium ore on the southeastern shore of Great Bear Lake, indicating a number of amusing incidents.

Dr. Charles Camsell, President of the Canadian Geographical Society, and Deputy Minister of Mines and Resources, who is familiar with much of the mining territory now being developed, and undertook the first geological survey around Great Bear Lake in 1900, explained that the Society was fortunate in having as a director such a man as Mr. Snyder, who had contributed materially to the knowledge of this country's mountain and mineral fastnesses. He had ventured into a region that was previously inaccessible and unknown, a land of romance and mystery to which prospectors had gone, never to return, and one of mythical tropical valleys. Mr. Snyder had presented to Canada a fine group of wood buffalo, now in the National Museum, and a group of the rare black-tailed white sheep, secured during his last expedition, are now being prepared for mounting.

The story of his expeditions and ultimate discovery of the Snyder range of mountains might be termed the tale of the black-tailed white sheep, for reports of such a creature and controversy concerning the existence of this animal induced him to seek a specimen in the territory that later revealed such geological wonders. References were made to pioneers of the West, such as Jack Stainer, the McLeod brothers who penetrated the Nahanni river in search of gold, lost their "poke" and later disappeared, their skeletons being discovered in 1906 by the R.C.M.P., and to Fred Lambart, well-known geographer, who served in this capacity on the Snyder expedition of last summer, and is to continue his exploration work during the comming summer.

Scenes of boat-building on the Mackenzie River proved interesting, but those of rapids on the South Nahanni River provided some conception of the difficulties encountered by members of the expedition, the current running at 23 miles an hour being stemmed by shallow boats powered with two outboard engines, one of which was overturned and thrown up against a wall of rock. Hell's Gate, on either side of which rise huge bastions of rock, was graphically portrayed, but the scenes of Virginia Falls brought enthusiastic comments from the audience. Twice as high as Niagara, a mighty volume of water was shown cascading over a 1,200-foot ledge of rock, spray rising high over projecting pinnacles, and plunging three hundred feet into the gorge below. Mr Lambart was credited with an estimate of 500,000 horsepower that could be developed in the vicinity of these falls.

Aerial pictures of the Snyder Mountains showed ridge upon ridge of ice-coated mountain peaks, so sharp that it is maintained this range is the most recent geological formation in North America. Extensive glacier fields, above which Mr. Snyder's single-engined seaplane flew with apparent facility, provided a striking contrast with the dark rock formations, but low-lying storm clouds forced the fliers to pass dangerously close to the mountain ridges before returning to their advanced base on a beautiful inland lake. This, incidentally, Mr. Snyder observed, was a paradise for fishermen. Although no photograph was procured of a "barren land" grizzly, which surprised the speaker and one of his companions at close quarters while they were seeking mountain goat, a scene of the desolate valley was shown on the screen, this having been taken after the bear had been killed.

Other pictures of wood buffalo in their natural habitat proved interesting, and particularly their evident lack of concern for human beings in the vicinity. This contrasts with the plains buffalo, which has a distinct distaste for the scent of man, and will stampede at the slightest provocation.

After leaving the Snyder Mountains, the speaker flew to Fort Simpson, on the Mackenzie, and north to Eldorado, on Great Bear Lake, where His Excellency Lord Tweedsmuir was entertained during his tour of the North West. Beautiful photographs in colour conveyed a clear conception of the Eskimo and the character of the country in which these northern residents of the Dominion live and have their being. Mr. Snyder paid tribute to the Royal Canadian Mounted Police and their "marvellous efficiency," observing that people of this country—"my country, for I am now a Canadian citizen"—have every reason to be proud of the work being undertaken in the north country by this force on behalf of the Eskimo. One post has an area of 40,000 square miles, and yet a few men provide adequate supervision over the wide territory, travelling great distances by dog team. Much credit was also accorded the missionaries "down north."

Money has no meaning for the Eskimo, Mr. Snyder said, but he has a definite interest in the provision of food. If this should fail, as has happened during the current winter, the Eskimo is left destitute, "and all the happy people you see in these pictures are now in a sad state, the cariboo herds having gone south, while the seal and fish have disappeared." If it had not been for the R.C.M.P., who located a herd of moose, their plight would have been serious.

Moving pictures of the oil wells at Fort Norman, where storage tanks have been erected, the construction of an 8½-mile pipe line around the Great Bear Rapids, the transportation of dynamite used in large quantities at the Eldorado mine, and scenes on the "silver pavement" were shown, from all of which could be drawn a remarkable picture of present development and future promise.

EDITOR'S NOTE BOOK

William Donald Albright, the author of "Past, Present and Future of the Peace" published in this issue, was born on a farm near Cayuga, Ontario, where he spent his early years. After his graduation from the Ontario Agriculture College in 1903 he was for some years associate editor and editor of the Maritime Farmer, Sussex, New Brunswick and Farmer's Advocate, London, Ontario. In 1913 he went out to the Peace River region where he is now Superintendent of the Dominion Experimental Substation at Beaverlodge, Alberta. He has travelled thousands of miles lecturing within the Peace, and in 1929 and 1930 he flew 425 miles over it and down the Mackenzie to Herschel Island. He is a Fellow of the American Geographical Society of New York and a member of the Committee for Canada of the International Geographical Union.

T. R. Elliott who contributes in this issue "Fibers of Gold" was born in Goderich, Ontario. He studied at Goderich Collegiate Institute and the University of Toronto. In 1912 he started newspaper work with London Free Press. Mr. Elliott is the author of the successful historical novel "Hugh Layal" (MacMillan 1927), and many short fiction stories with Canadian background. During the great war he served overseas with the Canadian Artillery.

H. E. M. Kensit who contributes the article entitled "Ship Canals of Europe" was born in England where he graduated in electrical engineering in 1894. Coming to Canada in 1908 he was engaged mainly in the investigation of electric power projects for the Dominion Water Power Bureau of the Department of the Interior for some 20 years when he retired to enter private practice in 1931. Mr. Kensit is a mamber of the Engineering Institute of Canada and of the Association of Professional Engineers of Ontario.

AMONGST THE NEW BOOK

The Encyclopaedia of Canada. General Editor W. Stewart Wallace. In 6 volumes. Toronto. University Associates of Canada. 1935-1938.

With the publication of volume six, this very important work of reference has been brought to a successful conclusion. Since the appearance of the first volume in 1935, tribute has been paid repeatedly in these columns to the thoroughness and scholarly accuracy of the work done by the General Editor, Mr. W. S. Wallace, and his associates. The *Encyclopaedia of Canada* reflects credit, not only on the men and women who have embodied the results of their special knowledge in the various articles large and small that fill its six volumes, but also upon the enterprising publisher who has had the courage and resourcefulness to undertake such a really formidable task at a time when most publishers were pulling in their horns, and to present it to the public in a form that compares favourably with the products of the great publishing houses of London and New York.

Members of the Canadian Geographical Society will welcome the *Encyclopaedia* as a reference work that must be of increasing usefulness to them as they explore its thorough treatment of its particular field. How far-reaching is that treatment may be suggested by running over a few of the titles that fall within the field of Geography in this final volume. One finds, for instance, fairly full articles on such subjects as Transportation, Telegraphs and Telephones, Trade, Toronto, Water-powers and the World War, and adequate treatment of towns, large and small, like Simcoe, Sydney, Sudbury, Victoria, Vancouver, Yarmouth, Welland, Three Rivers and The Pas; Sir George Simpson, Thomas Simpson, David Thompson, Otto Sverdrup, Verrazano, Vancouver and others connected with exploration; and such places as Slave River, Lake Superior, Skeena River, Lake Simcoe, Temiscouata, Thousand Islands, the Temiskaming and Northern Ontario Railway, Vancouver Island, the Trent Canal, the Yukon Territory, York Factory, Yonge Street, the Yellowhead Pass, the Lake of the Woods and Waterton Park. There was a time when books of reference dealing specifically with Canadian subjects were few and unreliable. Such a reproach may no longer be applied to the Dominion, thanks to the appearance of such books as the *Encyclopaedia of Canada*.

LAWRENCE J. BURPEE.

Environment, Race and Migration, by GRIFFITH TAYLOR, (The University of Toronto Press, 1937, $3.50) is practically a new edition of his book "Environment and Race," with a considerable amount of new material added, much of which he has covered in various papers and lectures since the older volume was published. There has also been included a great number of new sketches and diagrams, most of which he has constructed himself. (Most of the subjects are treated more fully than in his previous work). Two of the new chapters enlarge on his treatment of Australian environment and provide a fund of information on that island-continent.

The book attempts to show that military power, religious beliefs and sagacious rulers are not real factors in national progress, but that environmental control is at least of equal importance, and that variation in environment is the dominant factor in influencing human evolution. Man becomes restless owing to overcrowding or to adverse environmental changes, and the result is a desire to migrate, aggressiveness and resultant wars. Just as geological changes have produced biological evolution and migration in the earlier and lower orders of animals, so man has reacted to the stimulus of environmental changes. Since population distribution, to a great extent, depends so largely upon environment, which is a factor of the physical

structure of the country, the author, in the first chapters of his book, delves into the evolution of the continents and their salient geographical features, and also discusses ethnological principles and culture.

The book is profusely illustrated with diagrams. It is to be deplored that many of these diagrams are not clearer. Such illustrations as "The geological whimsy" are rather involved and the analogies not clear. It is to be noted that most of the Australian illustrations are of a better grade than most of the others. The tendency to abbreviate is undesirable, as for example—Ash. for Ashcroft; Ham. for Hamilton; Drum. for Drumheller; Thet. for Thetford Mines—one needs an intimate knowledge of geography to permit of interpretation. The lettering is not proportional to the rest of the diagram, and too much generalization tends to make many of the illustrations hard to read.

A diagram should be as nearly self-explanatory as possible and is included to simplify the text, and should not need several lines or a paragraph to elucidate it.

The volume as a whole has many interesting and original ideas and should stimultate thought along the lines of Environment, Race and Migration.

The Land of Wales: By EILUND and PETER LEWIS, London. (B. T. Batsford, Ltd. 1937, price 7/6.)

The student wishing to know something of the history of Wales, of the national origins, outlook, life and culture of its people, will find in "The Land of Wales" a comprehensive review of the subject, which is interesting and instructive.

The authors review the early struggles of the Welsh people against the successive waves of invaders, from which the Welsh spirit emerged unsubdued. Castles and congested towns were built and eventually decayed, but the Welsh, devoted to the soil and local handicraft, remained in their rural setting with characteristics very different from those of the Anglo-Saxon or Norman invaders.

The industrial era is then reviewed. The mining of coal, iron and tin, with the attendant grime and squalor and the child labour of the earlier periods, and the suffering and unemployment brought on by the recent depression, are mentioned. In spite of this migration from farm to coal town during the 19th century, and despite the change of environment and the vicissitudes of the recent depression, it is the country background that is still the essential of Welsh life.

The importance of religion, literature and sport on the national life is indicated, and the volume concludes with some observations on the rise of recent nationalism.

The book is profusely illustrated, showing the characteristics of Welsh scenery, the artistic grandeur of whaleback hill and rugged mountain, of moor and valley, of castle and hamlet, of ancient cathedral and industrial town. With two maps, the whole ensemble presents a vivid picture of Wales, as viewed through the eyes of two ardent lovers of their home land, the opinions expressed being "freely and firmly held."

Hints to Travellers, Eleventh Ed. Vol. 2. (Royal Geographical Society, London, 1938. 14s.)

This new edition of "Hints to Travellers" is presented in three parts, the first of which deals with the preparation of travelling or exploring, and gives in condensed form a wealth of information regarding organization, provisions, clothing, transportation etc., for nearly all the out of the way places of the world, from Polar regions to those of the Tropics. Everything is mentioned from boat insurance for Arctic work, to the efficiency of an African porter, or the taboos of a bushman.

The second section deals with Photography and Scientific details, pertaining to meteorology, botany, geology, natural history and anthropology. It is brought up to date by including the latest methods of field work in these various subjects and the latter part of the volume has an excellent description of the treatment of various diseases which one might have to treat in out of the way places.

The frequent quotations throughout the treatise gives some slight insight into the character of some of the British explorers and the difficulties they met with.

The information packed into this volume, coupled with that gathered from local sources in the countries in which a traveller is interested, should assist materially in the organization and success of any expedition.

D. A. NICHOLS.

A Nature Lover in British Columbia, by H. J PARHAM (London: Witherby, 1937, 7/6 net) might almost have been called "With the West in *his* eyes" for it recalls Kathleen Strange's novel of pioneer days in Alberta in its story of the everyday experiences of an English family who made a home in the West. Mr. Parham had left England fifteen years before the story opens and had tried his hand at various callings including homesteading in Saskatchewan and market-gardening in Vancouver. In 1905 he decided to settle in the lovely Okanagan Valley, and hither, in turn, came his brother, mother and sisters, all to take an enthusiastic share in the work and many absorbing interests of the new home. A centre of neighbourliness and good cheer the family had an ever-widening circle of friends, chiefly among those who shared their enjoyment of the rich wild life of the region. The book is a record of many happy years of observation and association. Birds were the chief delight, but flowers, fish, and every kind of animal life found in Mr. Parham a keen student. Constantly adding to his store of knowledge, through books and the friendly help of other naturalists, he has provided a very complete record of the wild life of the Okanagan valley. There are charming photographs of this beautiful region and two bird drawings contributed by Allan Brooks, staunch friend of the author. Useful appendices will appeal especially to British Columbians. The titles are: Some Okanagan mammals, Okanagan fish, flora, birds. The book contains many entertaining stories, an interesting account of the Indians on the near-by reserves, experiments with Canada Geese who became comically companionable, and above all, of Banjo, the author's "retriever-setter" a remarkably intelligent and lovable dog.

William Tyrrell of Weston, by EDITH LENNOX MORRISON and J. E. MIDDLETON (Toronto: MacMillan, 1937, $3.00). Among Canadian geographers Tyrrell is a name to conjure with ever since the days when Joseph Burr Tyrrell and his brother James made their memorable survey across the sub-arctics of Canada in 1893. This book is the

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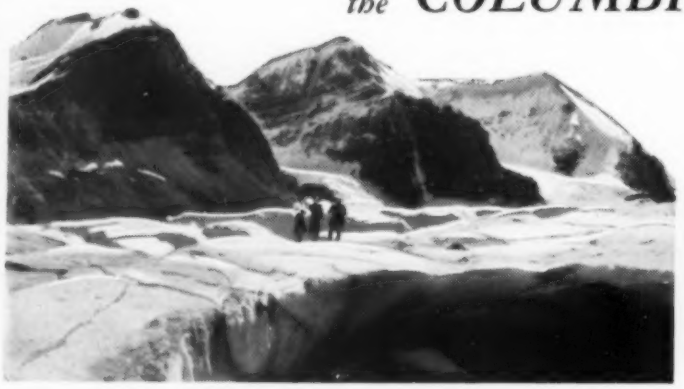

A stupendous area of glistening ice and snow, hitherto accessible only by pack train, the Columbia Icefield is now brought within easy reach of those exploring the wonders that are Jasper . . . from Jasper Park Lodge this great glacier is but an easy drive along a spectacular, newly-opened road. *See* Jasper in the Canadian Rockies—*on the main line of Canadian National Railways*—and thrill to the glories of 4200 square miles of Nature unspoiled, lovely as when created.

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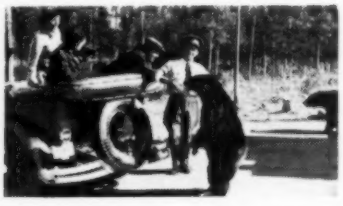

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romantic story of their father, long known as the Squire of Weston.

William Tyrrell, sixth son of an ancient Irish family in the county of Kildare, came to Canada in 1836 at the age of twenty. With no capital but a fine brain and mighty muscles, he carved out a career for himself, became a power in the community, and, on a modest competence, sent his four sons to University and his three daughters to Ladies' Colleges. Soon after arriving in Toronto he showed his adaptability by becoming a cabinet maker and, without previous instruction, turned out furniture of the highest quality. He taught himself architecture and engineering and did the best work of his time in building substantial mills, bridges, and houses, some of which stand to this day. His work as a contractor took him to various parts of Ontario, to Kingston and to towns up and down the Humber. It was in Weston that he finally settled in 1844 and in the following year married Elizabeth Burr, daughter of his friend Roland Burr. "Here," wrote young Tyrrell to his Irish relatives, "things in general are very different from home. A man, for instance, may marry a girl because he loves her, not for the fortune she may bring him."

The home, "Grange Cottage," built by Tyrrell for his bride soon became the rallying place for all that was best in the life of the town and county and here were entertained with unbounded hospitality many distinguished men and women who were proud to call him their friend. The poor and unfortunate were made equally welcome and many of them could tell of help unostentatiously given and debts forgiven. Here too the father of a growing family delighted in teaching them geology and botany and his great love for the country. Doubtless they thrilled to his tale of the Fenian raids in which as a young man he had some exciting adventures.

William Tyrrell took an active part in the political activities of the time and but for the dishonesty of returning officers would have sat in Parliament. All good causes, municipal, humanitarian or educational found in him a staunch supporter. He became an authority on municipal law and administration and served his town and the county of York faithfully for over sixty years. All his dealings with his workmen, his family, his fellow citizens showed him a strong and just man, sensitive to the troubles of others and silent about his own. When at last in November 1904 the Squire of Weston passed quietly out of this life, he left a goodly heritage to his children and a great tradition of honourable manhood to his country.

The authors of this excellent biography, William Tyrrell's grand-daughter, Mrs. Morrison and J. E. Middleton, well-known Toronto writer, have given us a portrait of a great man written with a restraint which would have commended itself to their hero, and have also painted a lively picture of Ontario history during four of the six periods of Upper Canada development. No Canadian should miss this delightful book.

Even Sir John Squire's appreciative introduction hardly prepares the reader for the enjoyment in

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store for him in *Ramblin' Jack, the Journal of Captain John Cremer, 1770-1774* (London and Toronto: Jonathan Cape, 1936, $2.50.) The Ms., transcribed and edited by a descendant of the captain, MR. R. REYNELL BELLAMY, in whose family it has been for one hundred and thirty years, is a series of reminiscences or "Memorandums of my Rambells", written by a grand old sailor of the time of Queen Anne and George I. The spelling of those days had a certain fluidity, as J. C. Squire notes, surpassingly illustrated by this old memoirist. One cannot be too grateful to Mr. Bellamy for retaining his ancestor's own orthography and quaint use of capitals. His "Rodamontaram Historey of my Life" opens with a painful account of early hardship, when as a child of eight he was placed on a man of war, and takes him through one naval voyage and eight in merchant ships to the age of 21 or thereabouts. With the candour and zest for life of a Pepys he spins his yarns, of relatives kind and unkind, his much-interrupted schooling, boyish escapades, "adventors" with pirates and privateers and visit to foreign ports, where "our fellows was a little obstrapolos at times when Corsico wine opperated in theair heads". It is interesting to read of his putting into a "verey good Harber, by description I hear now it was Hallafax", and of visits to "Cansor" and the Newfoundland banks. "An Indian here (at Halifax) came in a Canuoe... and we made Them well and merry in liquor. The Indians were excessive sevill...giving us boxes, fowles and Sundrys too long to mention, and we parted with fowled Arms, a Signall of friendship."

Mr. Bellamy's admirable preface gives us a truer perspective, however, of the man and his times. In his concluding paragraph he says: "From Admirals of the Royal Navy down to Tom-boys of Merchant Marine, they were a tough hardy lot, reared in a brutal school, but they were

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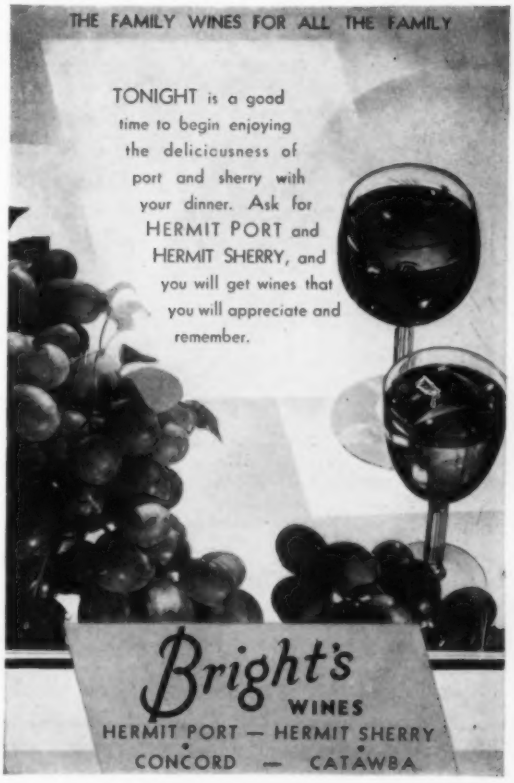
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Biographies in Who's Who often have their most revealing touch under the heading "Recreations." So, after reading a long list of Hugh Quigley's achievements in such serious field as statistics, engineering and social science, one is relieved to find his leisure devoted to "books and rambling." His bibliography records some charming products of his rambles in "The Land of the Rhone" and "Lombardy, Tyrol and the Trentino," and now the firm of Barsford in their "Face of Britain" series have entrusted to him a labour of love in *The Highlands of Scotland* (London, Batsford, 1936, 7/6.) Mr Quigley in his preface describes his book as "a series of impressions of the finest parts of the Highlands seen with the appreciative eye of the ordinary cultured individual with some knowledge of artistic, literary, even economic and industrial backgrounds, with few traditions and few inherited prejudices." The illustrations from photographs by Robert Adam are superb, and as the author says "complete the written description, and perhaps more realistically than any words can do, convey to the reader something of the magnificence of Highland landscape." The book concludes with an index of place-names and four reference maps.

The Spirit of Paris, by PAUL COHEN-PORTHEIM, (London, Batsford, 1936, 7/6) will be hailed by discerning readers as the perfect "portrait of a city." The author, whose youth was spent in the art schools of Mont Parnasse and who later became philosopher, essayist and literary critic, died in 1932 in his beloved Paris whither he travelled when mortally stricken while on holiday in Portugal. One can only regret that he was unable to complete a study of Spain — a country that he had loved from his youth. His fame is assured however, by a series of thoughtful and delightful books, among which England the Unknown Isle, The Spirit of France and The Discovery of Europe are perhaps the most notable.

Cohen-Portheim's interpretation of Paris as it exists today is based on an intimate knowledge of its history and a passionate feeling for all the myriad aspects of its teeming life. He was an acute observer, witty and keenly sympathetic. One revels in his descriptions "of parks and gardens, with their fountains and strollers, the garish night-life of the Grands Boulevards, Mont Parnasse and Mont-

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martre; the Rive Gauche, the quiet old streets of the Ile de la Cité, the crumbling glories of the Marais . . . these and many more are explored with sympathy and perception, while separate chapters are devoted to Paris and the Theatre, and Paris and the Arts."

In an amazing final chapter the author convincingly argues that Paris is something greater than the Capital of France, more than an European metropolis, more even than the metropolis of the white race — it is a world city. He says, "In the age of Trusts and mass production, of the triumph of finance and industry, Paris trades in the goods of the spirit, in ideal merchandise, exercising its influence through book and picture, theory and criticism . . . and out of the confluence, reciprocal interpretation and co-operation of all cultures, it may perhaps produce a new culture, which will be a world-culture."

The many illustrations are the work of contemporary French photographers, and form a comprehensive and unusually beautiful collection. The book is well indexed and has a coloured frontispiece after the French artist Adrian.

Colour in the Canadian Rockies, by WALTER J. PHILLIPS and FREDERICK NIVEN. (Toronto: Nelson, 1937. $3.00). Walter Phillips' fame as a painter and printmaker will ensure an eager crowd of purchasers for this beautiful book in which are reproductions in full colour of thirty-two of his paintings as well as numerous line drawings. The end-paper map, a very "animated" one, prepares the reader for a thorough tour of the "Canadian Rocky Mountains east of the Great Divide", under the distinguished traveller and mountain climber, Frederick Niven. The book is a delightful one in every respect, ideal as a gift for friends overseas.

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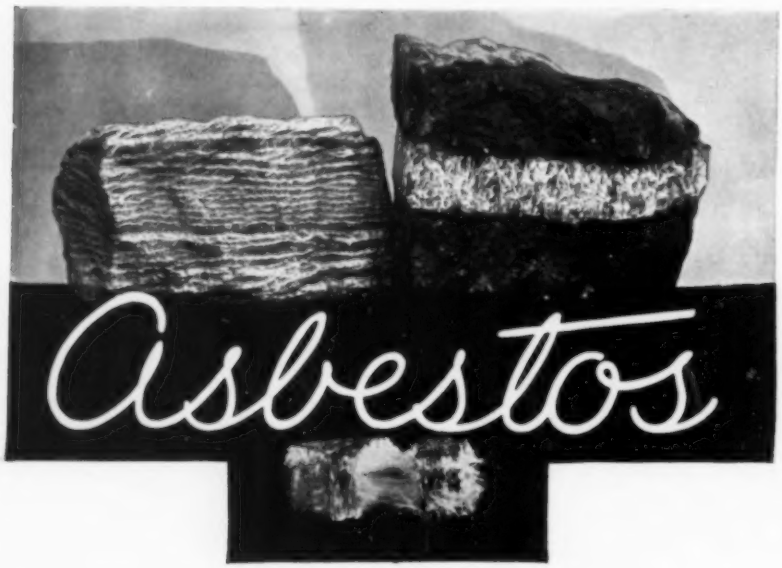

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